THE
METAL INDUSTRY
WITH WHICH ARE INCORPORATED
The Aluminum World—Copper and Brass—The Brass Founder and Finisher
ELECTRO-PLATERS REVIEW

Vol. 29 NEW YORK, JUNE, 1931 No. 6

Rochester, Host of the American Electroplaters Society

By G. A. LUX
General Railway Signal Company, Rochester, N. Y.

Nineteenth Annual Convention of the A. E. S. to Be Held in Rochester, N. Y., at the Seneca Hotel on June 29, 30, July 1 and 2, 1931

THOSE who have ever attended an Annual Convention of the American Electroplaters Society or who have ever visited Rochester, N. Y., will not need to be urged to attend the Nineteenth Annual Convention of the American Electroplaters Society this month.

The new and useful information about plating and allied subjects that will be reported at this Annual Meeting of the American Electroplaters Society will be invaluable to platers, chemists, production men and superintendents. Means of decreasing the percentage of rejections, faster methods, better appearing products, finishes that withstand corrosion better and more fool-proof methods are only some of the subjects to be discussed at the Nineteenth Annual Convention of the American Electroplaters Society.

Rochester has been an industrial city for over seventy-five years. It is unique in being the home of many industries which are so specialized that they supply practically the demands of the whole country. Plating is one of the important operations in most of these industries. Because of this fact anyone interested in the finishing of metals would find a visit to Rochester very profitable even if he were not so fortunate as to be there during the American Electroplaters' Society Convention.

Convention Headquarters

Industries of Rochester

The Eastman Kodak Company, the foremost producers of cameras, photographic accessories and rare chemicals, is world renowned. In Rochester there are three main divisions of this company. The Kodak Park Works produces a very large portion of the film used in the motion picture industry and the film, plates, papers and chemicals used in photographic work. At this plant most of the research of the Eastman Kodak Company is done in laboratories that are world famous. It was in these laboratories that the plating of rubber on metal was developed. The Hawk-Eye Works of this company manufactures lenses and cameras. The buildings of the State Street Plant and Main Office of the Eastman Kodak Company include Rochester's tallest building. Here cameras are fabricated and assembled. A glance at a Kodak or a Ciné-Kodak will give some idea of the amount of metal finishing done by this company.

The **Bausch & Lomb Optical Company** and one foreign company are the two greatest producers of optical instruments in the world. Rochester is the home of the Bausch & Lomb Optical Company. The range of products of this concern includes spectacles, binoculars, microscopes,

telescopes, range finders, ophthalmic equipment and a host of intricate optical measuring instruments. It may be truly said that the advancement of science and civilization has been materially aided by the products of this company. In the finishing of these products, practically every kind of plating is used.

The **Taylor Instrument Companies** are famous for the manufacture of high grade thermometers, barom-

Section of Cleaning and Plating Room of Stromberg-Carlson Telephone Manufacturing Company

eters, airplane instruments and other scientific equipment. Their temperature controllers may be seen on many chromium plating tanks. The obtaining of finishes on instruments to be used in the process industries is one of the problems of this company's finishing department.

The **Delco Appliance Corporation,** a subsidiary of the **General Motors Corporation,** manufactures electrical equipment such as starters, generators and other

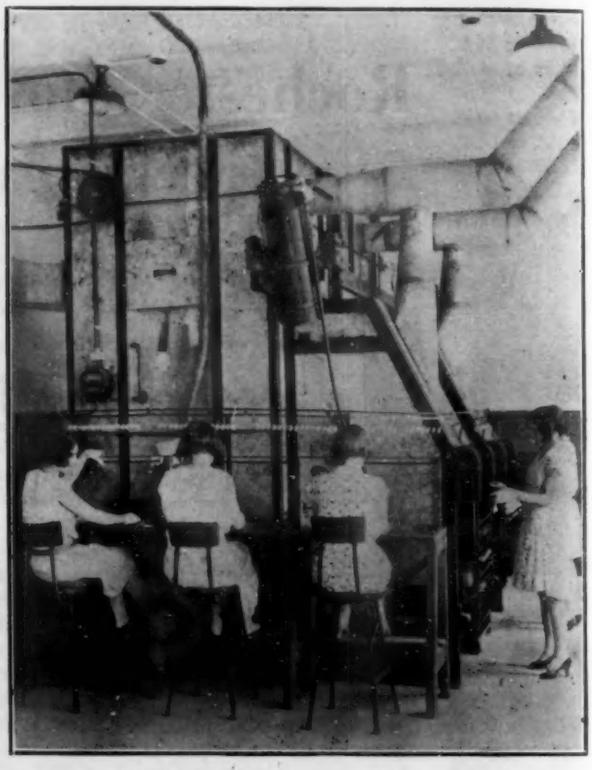
Washing and Cleaning Equipment at the Stromberg-Carlson Plant

devices used on automobiles as well as electrical household devices and small power plants for homes. As would be expected, metal finishing forms a large portion of this company's operations.

The **General Railway Signal Company** is one of the foremost companies interested in expediting and making railroad travel safe. Your trip to Rochester for the Convention, whether you travel by railroad or automobile, will be safeguarded by this company's devices such as automatic train control, signals, switch machines, interlocking plants and highway crossing signals. A heavy responsibility rests on this company's plating department to prevent corrosion and excessive wear on vital parts of their equipment.

The **Stromberg Carlson Telephone Manufacturing Company** has been known for a great many years first as the manufacturers of telephones and accessories, and now as the producers of a very fine grade of radio equipment. Plating possessing both fine appearance and lasting qualities is necessary on this company's products.

The **Todd Company** is one of the pioneers in the science of preventing the forging or raising of checks.



Automatic Lacquering Equipment at Plant of Hickok Manufacturing Company

Besides making several varieties of check writers, this company manufactures and prints checks of specially manufactured paper that prevents illegal alterations by erasing or bleaching.

The **Yawman & Erbe Manufacturing Company** are large producers of office equipment. Durability and appearance are prime requisites of all the metal finishing done in this company's large plant.

Another specialized industry located in Rochester is the **Ritter Dental Manufacturing Company.** This company is one of the very few who manufacture dental chairs, X-Ray equipment and other devices used by the dental profession. The finishes on this company's devices have long been noted for their appeal and durability.

The **Hickok Manufacturing Company** is located in Rochester. This company manufactures large quantities of high grade men's jewelry such as belts, beltograms and ornate braces and garters. Fine enameling, plating with rare metals and intricate metal form-

ing operations are the most important work done at this plant.

The **Metal Arts Company** and **Bastian Brothers Company** are manufacturers of a fine grade of novelty jewelry such as organization emblems, rings, pins and other novelties. Their reputation for fine work in this line is known throughout the country.

The **Robeson Rochester Corporation** makes electrical household appliances for sale in the jewelry trade and pocket cutlery. The quality of their finishes has enabled them to be classed as one of the better manufacturers of these commodities.

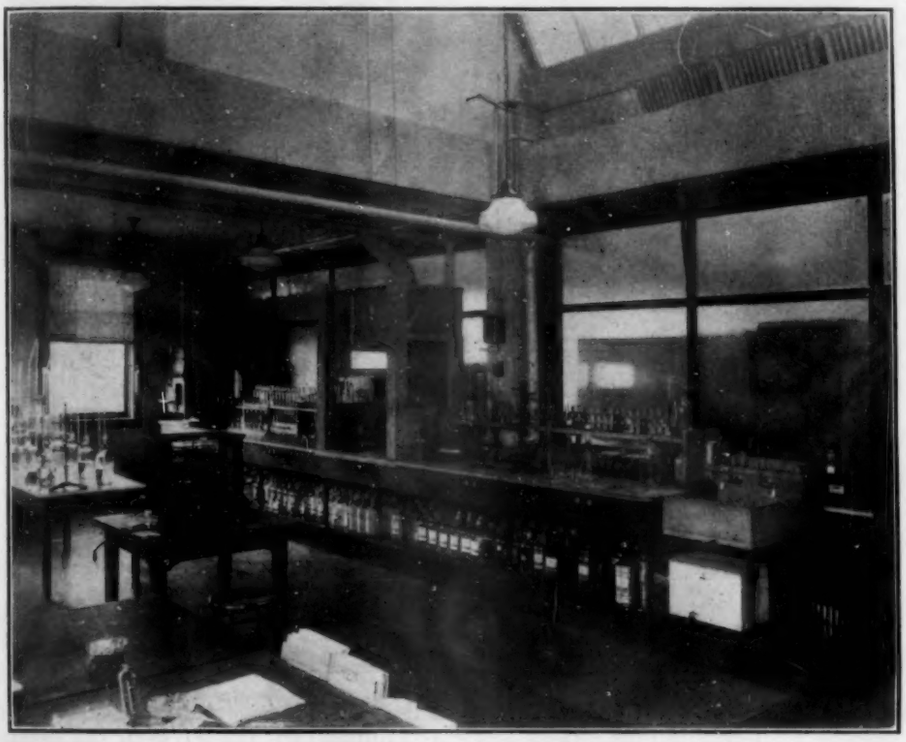
The **Wilmot Castle Company,** located in Rochester, manufactures sterilizers, and hospital equipment used in hospitals, laboratories and surgeons' offices. Nickel and chromium are the chief finishes used on this type of apparatus.

The **Sampson United Corporation** is a producer of household appliances, such as electric irons, percolators, serving trays, cutlery and other kitchen tools, in large volume for chain store sale.

Rochester is also the home of the **Electromatic Typewriters, Inc.** This company makes the only electric typewriter which has been a commercial success.

The **Folmer Graflex Corporation,** formerly a division of the Eastman Kodak Company, manufactures a large line of speed cameras for airplane and newspaper photography. The plating used on these cameras is of exceptional quality to withstand continued abuse and exposure to all kinds of weather.

These are some of the largest concerns in Rochester using plating in the finishing of their products. There are many smaller concerns whose volume of business is not as large, but the quality of whose plating is equivalent to that to be found in many of the larger plants. All of these companies in Rochester extend a cordial greeting to everyone interested in plating to visit their plants while in Rochester during the week of June 29th.



Section of General Railway Signal Company's Chemical Laboratory at Rochester

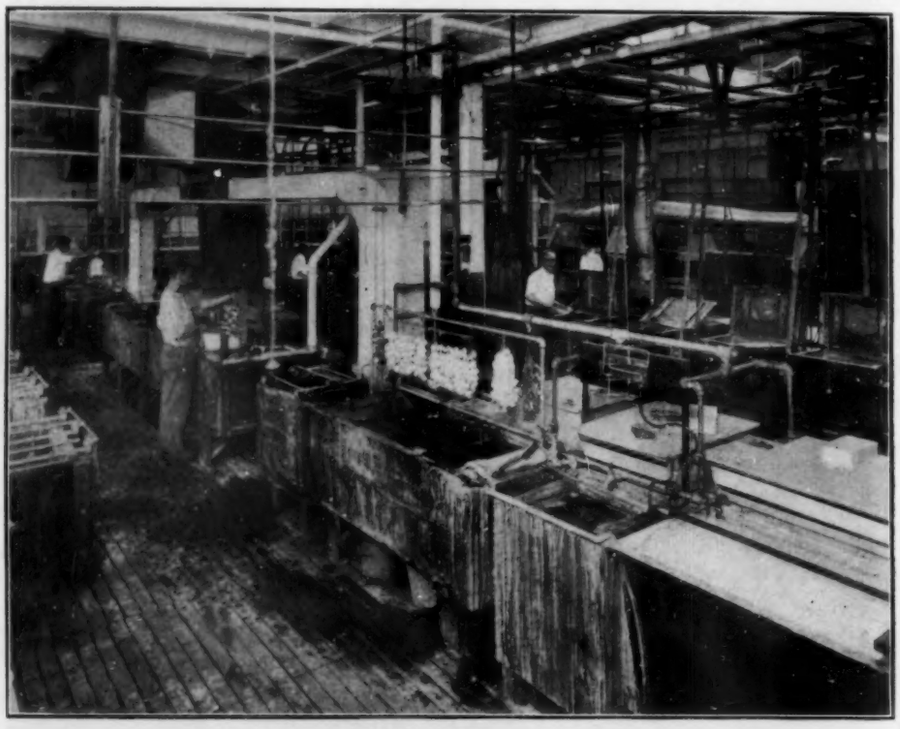
Growth of the Rochester Branch

Another measure of the progress of electroplating in Rochester is shown in the records of the Rochester Branch of the American Electroplaters Society. This chapter was started in 1911 with 13 members.

Scene at Closing of the 1931 Class in Electroplating of the Rochester Branch of the American Electroplaters' Society

In 1920 when the Eighth Annual Convention of the Society was held there, the membership of this branch was 40. At this time there are 84 members who are actively engaged in plating in the various plants in and near Rochester. The platers of the Rochester Branch are progressive. They needed no urging to conduct a class in plating analysis and control. Their first course in chemistry was started in 1918 at the University of Rochester. Today every member of the class has a complete portable set of chemical apparatus which he is using to intelligently control the solutions with which he is working.

Chemical control is not a passing fancy with the members of the Rochester Branch. This branch has taught its members how to analyze plating solutions and has established a permanent laboratory of its own with the necessary facilities to make and standardize solutions for the use of its members. Realizing that there is always something new to learn about controlling plating solutions, each Fall finds the members of the Rochester Branch of the A.E.S. attending class at their Branch's Laboratory once a week for review and advanced work.



Section of the Plating Room of the Hickok Manufacturing Company

There is no doubt that it will be to the benefit of platers and their employers to be able to come to Rochester for the opportunity of meeting progressive platers who are working for progressive firms.

Although the Convention Committee has planned to make information about electroplating the primary object of this convention, opportunities for social contacts and entertainment for the wives of the delegates have not been forgotten as the following program below shows.

Technical Papers

Some of the papers to be presented during the technical sessions are:

1. "Chromium Deposits Directly on Aluminum,"

Convention Program

Men

Monday, June 29th
- Morning: Registration
  Business Meetings
- Afternoon: Technical Session
- Evening: Technical Session

Tuesday, June 30th
- Morning: Technical Session
- Afternoon: Picnic at Ontario Beach Park
- Evening: Picnic at Ontario Beach Park

Wednesday, July 1st
- Morning: Technical Session
- Afternoon: Plant Visits
- Evening: Banquet

Thursday, July 2nd
- Morning: Technical Session
- Afternoon: Business Meetings
  Extra Plant Visits

Ladies

Monday, June 29th
- Morning: Registration
- Afternoon: Theater Party
- Evening: Open

Tuesday, June 30th
- Morning: Open
- Afternoon: Picnic at Ontario Beach Park
- Evening: Picnic at Ontario Beach Park

Wednesday, July 1st
- Morning: Shopping Tour
- Afternoon: Sight Seeing Trip
- Evening: Banquet

Thursday, July 2nd
- Morning: Open
- Afternoon: Sight Seeing Trip

by Dr. Work and C. J. Slunder of the Aluminum Company of America. Paper presented before the Electrochemical Society at the recent convention in Birmingham, Alabama.

2. "A Resumé of Silver Plating," by Frank H. Mesle of the Oneida Community, Ltd.

3. "The Growth of the Use of Artificial Abrasives in the Preparation of Metal Surfaces Before Plating," by Collins L. Hall of the General Abrasive Company.

4. "Full Automatic Plating Machinery," by A. H. Hannon of Frederic B. Stevens, Inc.

5. "Buffing Compositions," by L. R. Eastman of Frederic B. Stevens, Inc.

6. "Summary of Researches on Electroplating at the Bureau of Standards," by Dr. William Blum.

7. "The Porosity of Chromium Deposits," by W. P. Barrows and A. Brenner of the Bureau of Standards.

8. "Progress Report on Exposure Tests of Plated Coatings," by P. W. C. Strausser, Research Associate.

9. "High Speed Nickel Plating as Practiced in England," by Mr. Cannings. Paper presented before the Electrochemical Society at the recent convention in Birmingham, Alabama.

10. "Further Developments of Low pH Nickel Plating," by W. M. Phillips of the General Motors Corporation. Paper presented before the Electrochemical Society at the recent convention in Birmingham, Alabama.

11. "Tarnishing of Chromium Plating" by W. M. Phillips of the General Motors Corporation. Paper presented before the Electrochemical Society at the recent convention in Birmingham, Alabama.

12. "Looking Backward and Forward in the Electroplating Industry," by Charles H. Proctor of the Roessler & Hasslacher Chemical Company.

13. "Chromium Plating in the Automotive Industry with Special Reference to the Deposition of Chromium upon Articles made from Sheet Zinc in the Automotive Products Industry," by Charles H. Proctor of the Roessler & Hasslacher Chemical Company.

14. "A Study of Silver Plating Solutions," by B. Egeberg and N. Promissel of the International Silver Company. Paper presented before the Electrochemical Society at the recent convention in Birmingham, Alabama.

15. "From Mine to Consumer," a moving picture of the production of copper by the American Brass Company.

16. "The Use of the Colorimeter in Industry," by Theo J. Zak of the Bausch & Lomb Company.

17. "Electroplating on Cold Rolled Steel," by George B. Hogaboom of the Hanson-Van Winkle-Munning Company.

GEORGE GEHLING
Philadelphia Branch
President

R. J. O'CONNOR
Bridgeport Branch
First Vice-President

RAMON LOPEZ
Rochester Branch
Second Vice-President

H. A. GILBERTSON
Chicago Branch
Secretary-Treasurer

W. J. R. KENNEDY
Hartford-Conn. Valley Branch
Editor, The Monthly Review

Hotel Facilities

The Seneca Hotel, the headquarters of the Nineteenth Annual Convention of the American Electroplaters Society, is centrally located in Rochester. It is easily reached from all the railroad stations and automobile highways. It has 550 guest rooms at prices from $2.50 up. The good food, the courteous, efficient service and the comfortable, well-equipped rooms have united to make the Seneca, The Hotel of Rochester.

Convention Committee

The Convention Committee selected from the members of Rochester Branch of the American Electroplaters Society is composed of the following men:

S. P. Gartland, General Chairman.
J. R. Elster, Registration.
C. J. Griffin, Program and Printing.
W. D. Hart, Transportation.
F. J. Kohlmeier, Publicity.
R. P. Lopez, Hotel and Papers.
G. A. Lux, Finance and Entertainment.
H. W. Puffer, Ladies and Exhibit.
C. A. Reama, Ex-Officio.

Entertainment Features

These men have been working continuously since the first of the year to make this Convention of the American Electroplaters Society the outstanding Convention of this Society, not only from the point of excellency of technical papers, exhibits and plant visits, but also with a view to making every delegate's visit a pleasant one from the entertainment and social standpoint. The Committee has no fear of failure because the hospitality of the members of the Rochester Branch of the American Electroplaters Society is well known and Rochester has many facilities for entertainment. The numerous parks both in the city and on the many lakes near Rochester offer outdoor entertainment and sports. The high plane of musical and theatrical entertainment may be best shown by reminding the reader that Rochester is the location of the famous Eastman Theater and Eastman School of Music. Members of the various fraternal orders and college fraternities will find a real welcome from the brothers in the Rochester Chapters. The Masons, the Elks, the Knights of Columbus and the Moose have splendidly equipped new buildings which are the pride of the National Organizations and the Fraternity Houses on the new University of Rochester Campus on the Genesee River have already filled the hearts of the "Old Grads" with a justifiable pride.

The City of Rochester, the Rochester Chamber of Commerce, the industries of Rochester, the Rochester Branch of the American Electroplaters Society and the Convention Committee unite in inviting everyone interested in electroplating to attend the Nineteenth Annual Convention of the American Electroplaters Society in Rochester during the week of June 29th, 1931.

The International Fellowship Club

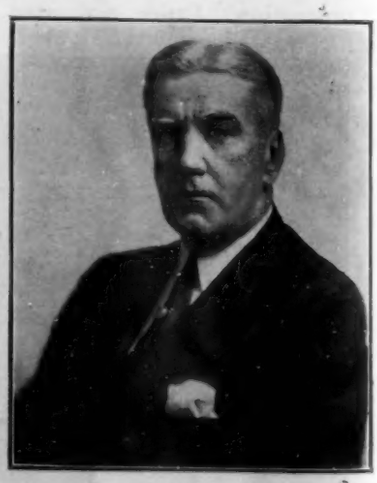
A History of the Organization for the Welfare of Those Who Sell Equipment and Supplies to the Electroplating and Finishing Trades

The supply man has always had a definite niche to fill in furthering the interests of the electroplating industry. There have been times, however, when supply men, and perhaps other associate members of the American Electroplaters' Society, have felt that they were in a class apart from the regular members. For that reason, it was inevitable that sooner or later, the more progressive men engaged in selling to the plating trades would consider the advisability of an organization directly suited to their own needs.

At the Milwaukee Convention of the American Electroplaters' Society in 1924, Frank J. Clark, Wilfred S. McKeon, the late Patrick J. Bergin and John A. McCabe sat in "executive session" until after midnight on Thurs-

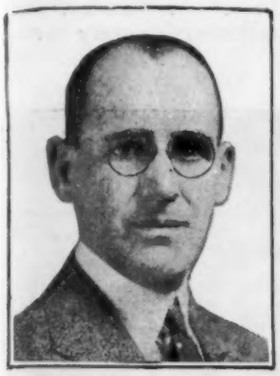
F. J. CLARK

JOHN C. OBERENDER

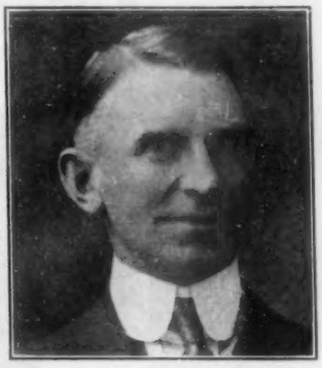


JOHN A. McCABE

day, July 22nd, discussing and working out the basic principles of such an organization. That exemplary citizen, Frank Clark, is entitled to the credit for creating the actual "thought-spark" that put the Club into being.



WILFRED S. McKEON



P. H. BERGIN
(Deceased)

His words were "There ought to be some sort of an organization that the supply man could enter, in which he could have a share of the responsibilities and privileges. In other words, it should be a salesmen's organization." This thought was immediately picked up by Wilfred S. McKeon and endorsed, with the consequence that Mr. Clark gracefully handed him the job of organizing the Club.

After the convention had closed, Mr. McKeon sounded the tom-tom of a special get-together meeting of supply men, to be held in a room adjoining the display space on the mezzanine floor of the Pfister Hotel and about twenty men answered his summons. Mr. McKeon was elected temporary chairman and John Oberender temporary secretary of the meeting. These two and George Lawrence were appointed a committee to look into the advisability of organizing such a body and to report at the next meeting of the American Electroplaters' Society in Montreal in 1925. In the meantime the committee was to meet and formulate their ideas.

In July, 1925, in Montreal, a permanent society called the International Fellowship Club was organized with the following officers: **Chairman,** Wilfred S. McKeon; **Secretary,** John Oberender; **Vice-chairman,** W. W. Wells. The plans and purposes of the organization are:

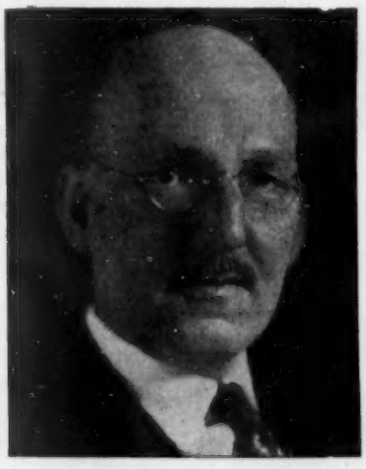
1. To have an organization interested primarily in the welfare of those who sell equipment and supplies to the electroplating and finishing trades.
2. To afford a means for the salesmen to get together and establish friendly intercourse for the purpose of better mutual understanding.
3. To establish a code of ethics for the best interests of the trade.

It was made clear that the new Club would not compete directly or indirectly with the old platers' organization. As Mr. McKeon stated to Charles H. Proctor, "The International Fellowship Club will not stand in the light or shadow of the American Electroplaters' Society."

WILLIAM SCHNEIDER

Since that first gathering in Montreal, regular meetings have been held at the annual conventions of the American Electroplaters' Society, at the January open meetings of the Chicago Branch and the February open meetings of the New York Branch. The annual meetings have been held successively in Newark, Toledo, Toronto, Detroit, and Washington. The Club is now in its seventh year and flourishing. It has been highly successful in establishing its aims, and although much work still lies ahead, it has been a power for good in the industry.

E. LAMOREAUX



GEORGE B. HOGABOOM

R. J. HAZUCHA

No clearer exposition of the ideals of the International Fellowship Club can be expressed than by its code of ethics.

Code of Ethics

1. To be guided by the laws of honor and to compete with fairness and honesty.
2. To refrain from false references to competitors and their products or the circulation of harmful rumors concerning them.
3. To strive for a better knowledge of materials and processes so as more efficiently to advise his customers.
4. To promote the welfare of the industry.
5. To remember that information gained in the line of business is privileged and inviolable, not to be revealed except with full consent.
6. To assure the buyer full co-operation and the use of as limited amount of his time as the subject at issue will permit.

7. To co-operate in every way with those engaged in activities which will aid and improve the industry and to work with our competitors in all lawful ways to increase the efficiency and service to the industry as a whole.

8. To actively support the Federal Trade Commission in locating and prosecuting individuals guilty of improper practice.

9. To respect all obligations and to require that obligations to us and our companies be respected.

10. To adhere faithfully to the rules of conduct herein set forth, recognizing that a simple guide to right action is found in the practice of the Golden Rule.

W. W. WELLS, JR.

BENJAMIN POPPER

G. CANNON

THOMAS A. TRUMBOUR

ROBERT LEATHER

Plans for Rochester

The International Fellowship Club has ambitious plans for its meeting in Rochester at the time of the annual A. E. S. convention. In addition to the regular meeting, which will of course, be held, the Club has decided to do something worth while for the convention as a whole and to give all those who attend something to remember them by.

They will hold an "Open House" on Monday, June 29th, and give a dance with refreshments to every person who attends the convention including all members of the American Electroplaters' Society, their friends and guests, both ladies and gentlemen.

The Club wants everyone to attend. A six-piece orchestra will be provided and the refreshments will be more than ample. This is the first time that the Club has ever undertaken anything so large or expensive, but knowing the calibre of its members, everyone may be sure that the entertainment provided will be the best obtainable in every way, and that this will be one of the outstanding functions of the convention period.

Plating on Magnesium

Q.—I have been reading an article describing "Electron." It states that this alloy cannot be silver plated. Does this mean that if a piece of it were partially coated with copper and then put in a silver plating solution, the silver would be deposited on the copper and not on the bare alloy surface?

A.—"Electron" is a high-magnesium alloy, containing about 97 per cent of that metal.

It is possible to nickel plate magnesium alloys, but if the plated pieces are placed in clean water and allowed to stand for 24 hours, the nickel deposit will be a black powder. There will be a gassing in the water immediately, and an action that soon destroys the deposit.

We have not, as yet, seen an electroplate on a magnesium alloy that will stand up.

G. B. H.

Chromium Deposits Directly on Aluminum

By HAROLD K. WORK and CHARLES J. SLUNDER

Chemical Engineers Aluminum Research Laboratories, Aluminum Company of America, Buffalo, N. Y.

Thin Layers of Chromium Which Have Fairly Good Resistance to Salt Spray and Atmospheric Corrosion May Be Electrodeposited Directly on Aluminum. Such Deposits Have a Gray Color and Must Be Buffed. These Deposits Protect Aluminum from Alkaline Corrosion

PAPER PRESENTED AT FIFTY-NINTH GENERAL MEETING OF THE ELECTROCHEMICAL SOCIETY, AT BIRMINGHAM, ALA., APRIL 23, 24, AND 25, 1931.

THE deposition of chromium directly on aluminum is briefly referred to in several articles. Gardner[1] developed a method which achieved a certain amount of commercial use, but the process is not described. Pfanhauser[2] indicated that such plating is possible, but that the adhesion is questionable. Fink[3] stated that chromium may be deposited on aluminum. These references, however, give little or no information on the processes. Still other methods have been used. For the most part, however, they have not been published, or if they have, they likewise give incomplete information. Valuable suggestions have been obtained on the application of heavy deposits of chromium directly on aluminum from unpublished experiments of W. Blum and G. E. Renfro at the Bureau of Standards.

Investigation of chromium deposits directly on aluminum revealed that they have unusual and useful properties. The best plating procedure depends on the particular application contemplated, the type of alloy plated upon, and the required thickness of the plate.

Method of Plating

Where only a thin chromium plate is required on the aluminum it is merely necessary to clean in a hot alkaline cleaner consisting of 7.5 g./L. (1 oz./gal.) each of sodium carbonate and trisodium phosphate and then plate. In this cleaning, however, it is essential that the aluminum be dipped sufficiently long to cause a slight etching of the surface. Thirty seconds to one minute is usually sufficient. This is particularly necessary where resistance to alkali is sought. Failure to do this generally results in poor adhesion.

The alkaline cleaning may be followed by a short dip in 5 per cent hydrofluoric acid, although this step is not absolutely necessary. It serves as a supplementary cleaning.

The above procedure is particularly suited for use on wrought aluminum. On castings this cleaning procedure may leave a dark non-adherent deposit on the metal surface, so it may prove necessary to remove it by a dip in the following mixture of nitric and hydrofluoric acids (solution A):

Nitric acid (HNO_3), sp. g. 1.42.....3 parts
Hydrofluoric acid (HF), 50 per cent .....1 part
Temperature, 27° C. (80° F.)

For thin chromium deposits this dip is brief, that is, three to ten seconds. After the dip has been used for some time impurities may build up in it so that the surface of the metal acquires a brownish layer during rinsing. A second dip in a mixture of equal parts of concentrated nitric and sulfuric acids will remove this.

For the chromium plating, any of the ordinary baths appear satisfactory. Two that have given good results are:

	g./L.	oz./gal.
No. 1[4]		
Chromic acid (CrO_3)	250	33.5
Sulfuric acid (H_2SO_4)	2.5	0.34
No. 2[5]		
Chromic acid (CrO_3)	250	33.5
Sulfuric acid (H_2SO_4)	1.25	0.17

In applying these thin chromium deposits on aluminum

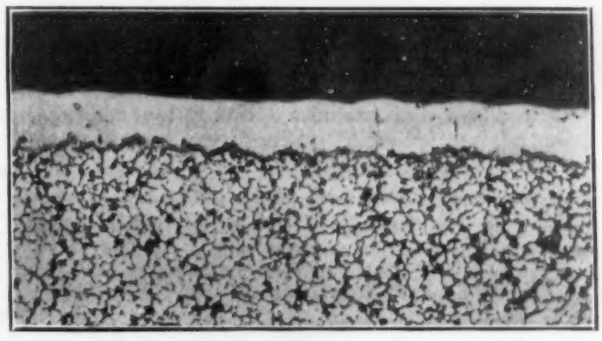


Fig. 1. Cast Aluminum, Surface Etched with HF + HNO_3 (Solution A) and then Chromium Plated

a current density greater than that recommended for other metals is required in order to completely cover the aluminum surface. The exact current density for any given temperature depends largely on the shape and size of the article being plated. A value of 21.5 amp./sq. dm. (200 amp./sq. ft.) or more is usually desirable at about 45° C. (113° F.). The length of time in the plating bath may vary from 3 to 30 minutes.

Thin chromium plates invariably come from the bath with a dull gray color. When plated from a hot solution, for example, at 48° C. (118° F.), the chromium is lighter in color than when plated from a cold solution such as

[1] H. F. Gardner, Iron Age, 124, 325 (1929).
[2] Metal Ind. (New York), 24, 151 (1926).
[3] C. G. Fink, J. Soc. Automotive Eng., 20, 157 (1927).
[4] H. E. Haring, Bur. Stand. Techn. Paper No. 346, p. 447 (1927).
[5] H. L. Farber and W. Blum, Bur. Stand. Res. Paper No. 131, p. 53 (1930).

at 27° C. (80° F.), but the deposit from the cold solution is much more readily buffed to a higher luster. By buffing the aluminum well before plating, it is possible to obtain a chromium plate which colors as readily as nickel, although the finish appears somewhat bluer than when the chromium is deposited over nickel.

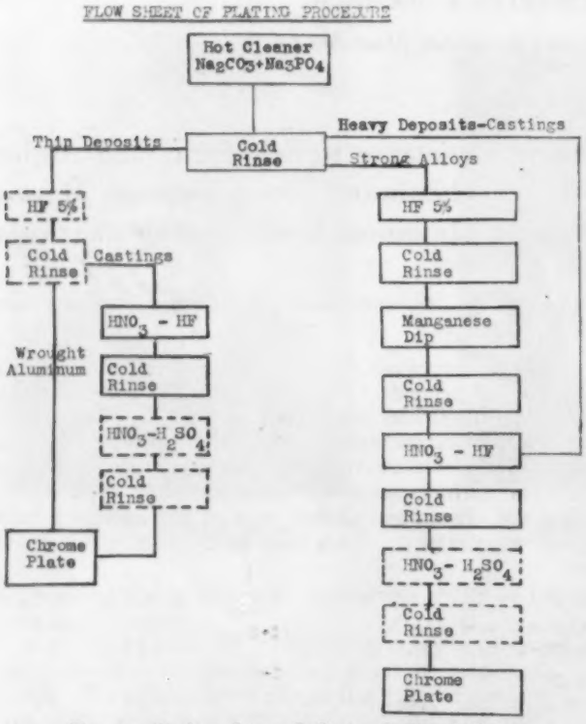


Fig. 2. Broken Lines Indicate Optional Steps

Where thick chromium plates are required, for example, 0.001 in. (0.025 mm.) or more, it is advisable after the alkaline cleaning to use a more drastic etching procedure to roughen the surface and to anchor the plate. To date practically all such tests have been confined to high-strength alloys and castings. Using the etching procedures advised for nickel plating,[6] very promising results have been obtained on 17ST (Cu 4.0 per cent., Mn 0.5 per cent, Mg 0.5 per cent, strong alloy, heat treated and aged). The following etch was made:

	g./L.	oz./gal.
Manganous sulfate ($MnSO_4.2H_2O$)	4	½
Hydrochloric acid (HCl)	160	21.5

Temperature, 21° C. (70° F.). Time of dip, 45 sec.

When the aluminum is etched sufficiently to insure good anchorage, the surface may be covered with a dark deposit, and a dip of a few seconds in the nitric-hydrofluoric acid mixture recommended above for etching castings may prove beneficial.

Excellent results were obtained on castings by direct treatment with the following etching solution A:

Nitric acid (HNO_3), sp. g. 1.42	3 parts
Hydrofluoric acid (HF), 50 per cent	1 part

Temperature, 27° C. (80° F.).

Time of dip—	
Die castings	30 sec.
Permanent mould castings.....	60 sec.
Sand castings	120 sec.

TABLE I. CORROSION TESTS ON CHROMIUM-PLATED ALUMINUM

Time of Plating Min.	Salt Spray* (20 per cent NaCl)	Ninety Days Atmospheric Exposure
2 4 8 15	A large number of very fine pits after 24 hours. Specimens kept in salt spray for 240 hours. During this time the corrosion had not progressed very rapidly and the pitting was only slightly more severe than at end of 24 hours.	All specimens were pitted. The pits were very fine and corrosion was not severe. The pitting was noticeable at the end of 30 days and did not appear to be any worse after 90 days.
30	A few small pits were visible after 24 hours. The corrosion continued slowly and at end of 240 hours only a few corroded spots were present.	A few fairly large pits present at the end of this time.

* A rather unusual behavior in the salt spray was noticed in that only one side of each specimen was corroded. Turning them around so that different parts faced the spray did not change this corrosion to make it resemble the more uniform corrosion of nickel-plated aluminum.

[6] H. K. Work, Trans. Am. Electrochem. Soc., 53, 361 (1928).

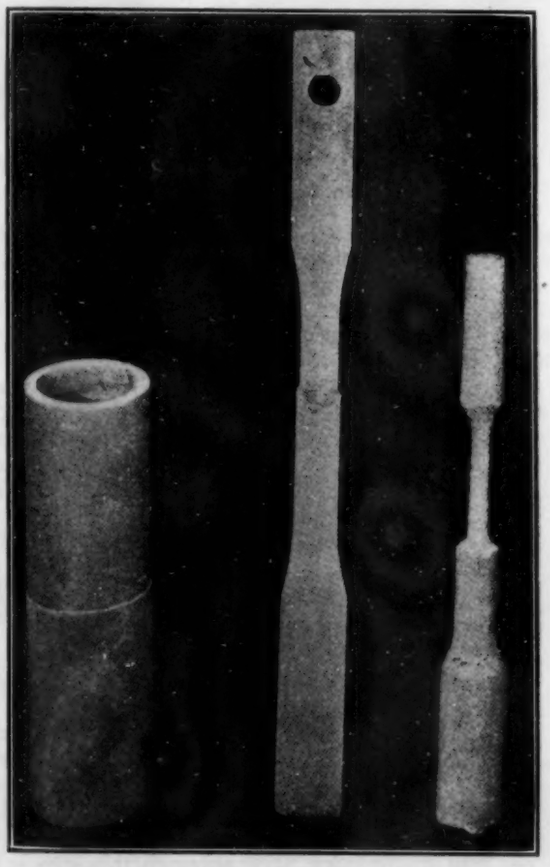


Fig. 3. Lower Half of Each Piece Chromium Plated (15 Min.), Then All Completely Immersed in 25 Per Cent NaOH Solution

A micrograph of such a plate on a die casting is shown in Fig. 1.

The plating conditions used for the heavy chromium deposits were based on some unpublished experiments of Blum and Renfro at the Bureau of Standards. In their experiments, best adhesion was obtained by the use in the chromium deposition of a relatively high temperature, 60° C. (140° F.), and current density, 40 amp./sq. dm. (370 amp./sq. ft.). These conditions give excellent results. For convenience of reference the above procedures are illustrated as a flow sheet in Fig. 2.

Properties of Deposits

Thin chromium deposits directly on aluminum have fairly good resistance to outdoor exposure and to the salt spray (20 per cent NaCl). This is indicated in Table I. It is interesting to note in connection with Wirshing's[7] results on heat treatment that in our experiments heat treatment for one hour at 232° C. (450° F.) after plating improved the corrosion resistance on outdoor exposure but did not seem to have an appreciable effect on the salt spray results. Generally speaking, the heavier the plate the more resistant it will be.

In view of the fact that the chromium is porous, as indicated by the above corrosion tests, surprisingly good resistance to alkaline solutions has been obtained. While a five-minute plate was beneficial, a fifteen-minute plate protected the aluminum remarkably in hot 2.5 per cent sodium hydroxide solution, as illustrated in Fig. 3. This plate is proving valuable in protecting aluminum against mild alkalies.

Where abrasion resistance is desired on alloy 17S and on castings, adherent deposits of 0.001 to 0.004 in. (0.025 to 0.1 mm.) have readily been obtained. Pistons have been plated and have given good results in service tests.

[7] Trans. Am. Electrochem. Soc., 58, 89 (1930).

Summary

Methods of plating chromium directly on aluminum are described whereby thin highly polished plates may be obtained. Where appearance is the primary consideration, plating should be done in a cold solution and the deposit buffed. Time of plating may vary from 3 to 30 minutes, heavier deposits giving better corrosion resistance.

For resistance to alkalies, increase in the thickness likewise improves resistance. While a thin plate is beneficial, a fifteen-minute deposit is remarkably effective.

Heavy deposits that are resistant to abrasion have been obtained on castings and on 17S metal (strong alloy).

Plating with Rare Metals

By DR. JOSEPH ROSSMAN

Chemical Engineer, Washington, D. C.

Some Recently Patented Solutions for Platinum, Palladium, Rhodium and Iridium

ELECTROPLATERS have recently shown a considerable interest in plating with the rare metals. Two patents have been recently granted for plating with palladium, rhodium and platinum.

U. S. Patent No. 1,779,436 dated October 28, 1930, issued to C. W. Keitel and assigned to Baker and Company, Newark, N. J., describes the use of the ammino nitrite salts of the rare metals such as platinum, palladium and rhodium. This salt is difficultly soluble in water, but is readily soluble in hot dilute ammonia whereby it is transformed into tetrammino nitrite which is very soluble in water. By introducing such ammino salts into the bath for electro-depositing and keeping it ammoniacal, the metallic concentration of the solution can be kept constant without deteriorating the bath.

To prepare the diammino salt, taking platinum as an example, a concentrated solution of platinum chloride or sodium platinum chloride is taken and a slight excess of a concentrated solution of sodium nitrite is added. This causes a change of color from orange to light yellow or nearly colorless, and nitrous fumes are given off as a gas. Heat is applied until no more reaction takes places, and after cooling, a slight excess of ammonia is added. The resulting precipitate, platinum diammino nitrite, is filtered and washed alkali free.

To prepare an electroplating solution from the platinum diammino nitrite, 100 grams of a suitable conducting salt, such as ammonium sulphate, are dissolved in one liter of distilled water containing 5 per cent ammonia. Then, 20 grams of the platinum diammino nitrite are added, and on heating to boiling, the platinum diammino nitrite will go into solution as platinum tetrammino nitrite.

In the electrolysis 2.2 volts or more are used. The temperature of the bath should be 95 degrees C. or more and the solution should be kept ammoniacal, the platinum diammino nitrite being added as needed to supply platinum. It will be noted that the bath made as above described will contain no chloride or other halogen compound, to accumulate and cause the bath to deteriorate, and furthermore, it will be noted that in replenishing, as stated, a bath containing a chloride or other halogen compound, the same will not be increased above the original content.

Plating salts for other metals of the platinum group, such as palladium and rhodium, can be made in a way corresponding to that which has been described for platinum, using palladous chloride for palladium and rhodium trichloride for rhodium.

Deposits from these solutions are very dense and the metals can be deposited singly or an alloy deposit secured by mixing solutions. For example, if platinum and palladium solutions are mixed together a deposit of an alloy of the two metals will be obtained. Platinum and rhodium solutions mixed give a platinum-rhodium alloy deposit, palladium and rhodium solutions a palladium-rhodium alloy, and so on.

Another U. S. patent, No. 1,779,457, October 28, 1930, also assigned to Baker and Company, describes in detail the preparation and use of a platinum plating bath and a platinum-rhodium alloy bath.

In the first example two grams of chloroplatinic acid are dissolved in 140 c.c. distilled water and 3 grams of sodium nitrite added. This solution is heated at 85 to 90 degrees C. until the orange color of the original solu-

tion is changed to colorless or a very pale yellow. This color change probably indicates a reduction from tetravalent to divalent platinum to form the complex salt sodium platinum nitrite. 5 c.c. of ammonium hydroxide (sp.gr. 0.90) are now added forming a platinum ammino nitrite after which the solution is ready for use.

The object to be plated is made the cathode and an anode of platinum is provided. Best results are obtained at 7 volts with a current density of 0.05 to 0.08 amperes per square inch of cathode surface while the bath is maintained at 75-95 degrees C. A bright adherent plate of platinum is obtained.

For producing a platinum-rhodium alloy 1.8 grams platinum chloride and 0.2 grams rhodium chloride are dissolved in 140 c.c. distilled water and 3 grams sodium nitrite added. This solution is now heated at 85-90 degrees C. until a change of color to a very pale yellow takes place. 5 c.c. of ammonium hydroxide solution are now added. This solution when used as the electrolyte with a platinum anode gives an adherent cathode deposit of approximately 90 per cent platinum and 10 per cent rhodium.

The ammino nitrite solutions are especially adapted for plating the precious metals on copper, nickel, gold or alloys such as brass or white gold, and other precious metal alloys used in jewelry or scientific instruments.

An old U. S. patent No. 367,731, August 2, 1887, which is now expired, deposits platinum from the following bath: One ounce chloride of platinum, twenty ounces phosphate of soda, four ounces phosphate of ammonia, one ounce chloride of sodium; the whole of the ingredients are dissolved in sufficient water and used to make one gallon of solution.

Another expired U. S. patent No. 330,149, November 10, 1885, uses the following formula for plating with palladium: chloride of palladium, dry, ten grams metal; distilled water, five liters; phosphate of ammonia, one hundred grams; phosphate of soda, five hundred grams; benzoic acid, ten grams. The benzoic acid may be omitted, but it bleaches the deposit and renders the deposit more striking upon iron and steel.

To use this bath, place it in a vessel of glass or porcelain. The bath is used cold, if it is desired to have a steel-color deposit. If a white deposit is required, heat the bath from 40 degrees to 50 degrees centigrade. For plating iron and steel it is better to heat the bath.

Iridium, according to another expired patent 362,257, can be plated from an aqueous solution of the double chloride of iridium and sodium or of the double chloride of iridium and ammonium, containing about two ounces of metallic iridium to the gallon, and acidified with about one-half an ounce of sulphuric acid to the gallon.

The solution of the double chloride of iridium and sodium is prepared as follows: The hydrate of iridium is dissolved in the least possible quantity of hydrochloric acid and evaporated in a water bath to expel the excess of acid. The residue is then dissolved in water and an amount of sodium chloride is added sufficient to combine with all of the chloride of iridium present to form the double salt. The solution is then diluted to the required amount, so as to contain about two ounces of metal to each gallon of liquid. The required amount of sulphuric acid is then added, and the solution is ready for the electric deposition.

The solution of the double chloride of iridium and ammonium is prepared as follows: The hydrate of iridium is dissolved in the least possible quantity of hydrochloric acid and carefully neutralized with ammonium hydrate. It is then acidulated with sulphuric acid until all of the precipitate produced by the ammonium hydrate is dissolved, and finally diluted with water until each gallon of the liquid contains about two ounces of the metal. The solution is then ready for work when acidified, as before mentioned.

Rare metals have been deposited according to Marino, U. S. patent 1,073,432 by first adding to an aqueous solution of the metal salt a reducing agent such as magnesium boro-citrate and heating the solution. After cooling another reducing agent such as gluco-citrate or gluco-tartaric acid is added in the proportion of 15 per cent of the metal salt. Gluco-citric acid may be prepared by mixing together 1 molecular weight of glucose and 3 molecular weights of citric acid, and gluco-tartaric acid by mixing together 1 molecular weight of glucose and 2 molecular weights of tartaric acid.

For depositing iridium a solution of iridium chloride is used. For depositing palladium, palladium chloride is dissolved in ammonia. For rhodium the salt rhodium sodium chloride is used. Potassium platinate is used for attaining platinum deposits. This solution should be so perfectly neutral that, when diluted in distilled water, it will not alter the color of litmus paper which has been previously reddened by immersion in an acid. For depositing tungsten, it is necessary first to prepare a solution of an alkaline tungstate and then to pour it drop by drop into diluted nitric acid. The tungsten compound thus obtained is then dissolved in ammonium tartrate mixed with potassium or sodium phosphate.

Dip Brazing

Q.—What equipment is necessary for dip brazing?

A.—Generally speaking, all that is necessary is a suitable crucible for melting brazing spelter and a furnace for melting it. An ordinary metal-melting furnace of the crucible type answers nicely. The top can fit more closely because the crucible does not have to be lifted out as in making castings. The smallest size crucible that will handle the work to be done should be selected, in order to save both fuel and the necessity of melting large quantities of spelter, for the crucible must always be full.

Best results can be obtained by seasoning the crucibles for from 2 to 3 months before using. They should be kept in a warm, dry place such as the top of a heat treating furnace where the temperature is at least 150°F.

The best spelter to use is the long lump grain spelter, with any good hard-soldering flux. If it is necessary to use zinc to reduce the copper content of the spelter, use only the purest zinc. Never use scrap zinc for this work.

After the spelter has been melted slowly pour enough of the flux on top to make a layer from 1 to 1½ inches deep. Hang the pieces to be brazed on hooks of low carbon steel which can be dipped with ordinary tongs, being completely submerged in the melted spelter. The work must remain in the spelter until it has had time to become as hot as the spelter, when it should be taken out and shaken briskly to remove the surplus lumps which may have formed.

P. W. Blair.

Anode Rods

By GEORGE B. HOGABOOM

Electroplating Engineer, Hanson-Van Winkle-Munning Company, Matawan, N. J.

The Importance of Keeping Anode Rods Clean in Order to Ensure Good Electrical Contacts and Keep Uniform Voltage Throughout the Tank

FROM THE MONTHLY REVIEW OF THE AMERICAN ELECTROPLATERS' SOCIETY, MAY, 1931

EVERY precaution possible is taken to have work clean before it goes into a plating solution. The cathode bars are kept clean so that there will be a perfect contact to obtain the full value of the current flowing and to prevent light deposits or peeling. This is as it should be. But how about the anode rods? I have seen anode rods so heavily coated with crystallized or evaporated solution that had it not been for the knife edge of the anode hook there would have been little or no contact between the anode and the anode rod.

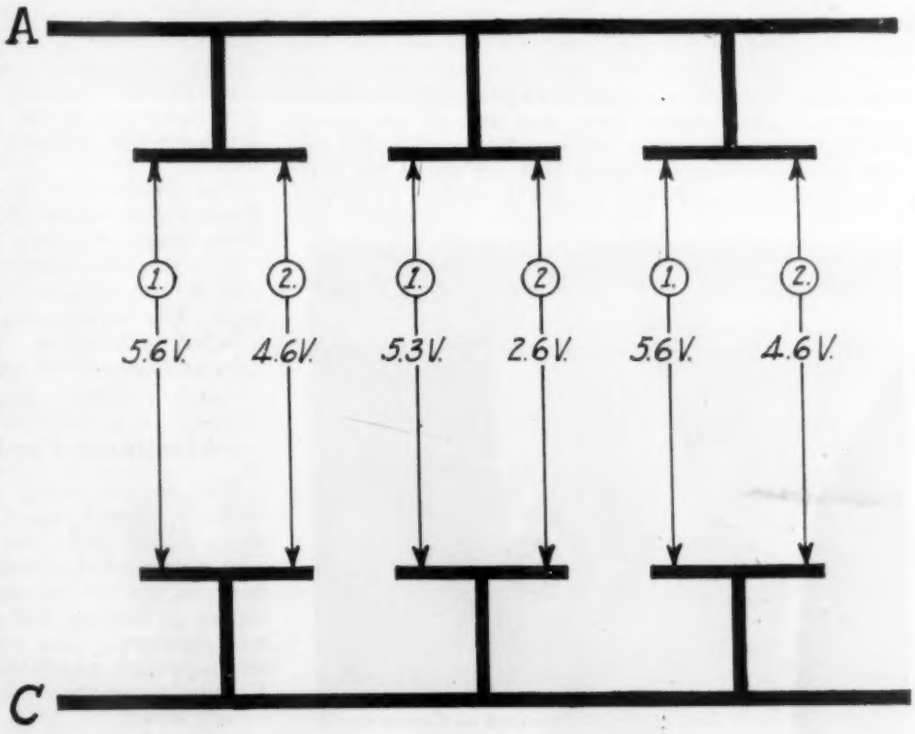
It is common practice to permit solution to drip onto the anode rods when work is being removed from the solution. It is overlooked that the solution will get between the hook and the anode rod and when the salts become dry that they will act as an insulator. If it is important to keep the contacts to the cathode rods clean, it is of equal importance to keep the anode rods clean. Insulation or partial insulation means a loss of anode efficiency unless a greater pressure is used.

The tank voltmeter may register the resistance of the whole tank, and the indicated voltage is taken as voltage used in plating. This will be misleading if all the rod and work contacts are not clean. A different voltage will be had between an anode that hangs on an unclean spot on the anode rod and the cathode rod than between the cathode rod and an anode having a clean contact. There will be a voltage drop between the two anodes and this will result in the anode having the lower voltage receiving a deposit of metal. This condition will affect both the anode and the cathode efficiency. The anode will not give up the amount of metal it should and the work directly in front of such an anode will have a lighter deposit of metal than the work in front of an anode having a clean contact.

The character of the anode corrosion is changed and this oftentimes explains why one anode corrodes better in a solution than another.

In one plant it was noticed that some of the nickel anodes had a heavy "skin" formed on them even when more than half of their weight had gone into solution. Of course the metal in the anode was to blame! The anode rods, however, were encrusted with crystallized salts; when the hook was lifted, only a faint trace of bright copper on the anode rod could be seen. The anode was replaced and with a portable voltmeter measurements were made between the several anodes and the cathode rod. There was a difference of 2 volts between pressure recorded from the anodes on either side of it which had clean contact.

If a completely insulated anode was hung between two active anodes, the current from the active anodes would pass through the insulated anode; it would go in one side and pass out the other. It is reasonable to assume that if there is a partial insulation the same thing will be true. There is a drop of potential between the anodes and the one having the lower potential will act as an



At Right—

Diagram Showing Different Voltages Obtained in Different Parts of One Tank, Due to Fouled Anode Rods

intermediate electrode. In the series refining of copper where one side of the copper electrode is the anode and the other side the cathode—a bi-polar electrode—there is a voltage drop of only 0.2 volts.

To prove this a tank containing 40 gallons of nickel solution was set up. Three anodes were placed on one rod and on the others were placed cathodes having an area equal to that of the anodes. The center anode hook was completely insulated from the anode rod. One end of a piece of resistance wire was connected to the anode rod and the other to the hook of the middle anode. Between the two outside anodes and the cathode there was a pressure of 5.6 volts; between the center anode a pressure of 5.3 volts. (See diagram). Within 24 hours the center anode showed evidence of receiving a deposit on a deposit on the side next to the tank from which it was separated by 6 inches. This was permitted to increase until it was heavy enough to photograph. (See Figure 1.)

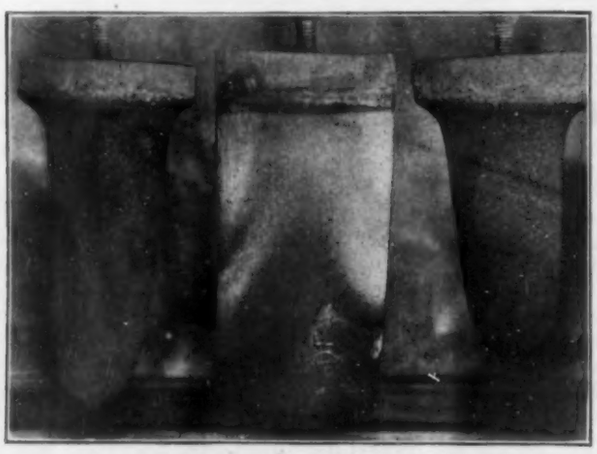


Figure 1. Deposit Acquired by Center Anode

The center anode was replaced by a new one and the resistance was increased so that there was a difference of two volts between the center anode and the outside anodes and the cathodes. (See diagram). This run was continued for several days, with the result that a very heavy deposit was had on the center anode. During the run the current at three different times was shut off for several hours. This caused three distinct layers of nickel deposit, as can be seen in Figure 2, which shows the front of the anode, that is, the side toward the cathode; Figure 3 is the back of the anode which faced the tank. The anodes on either side of the center anode were of the same size as the center anode at the start of the run. This clearly indicates that the center anode had a low efficiency and that the work in front of it received a light deposit.

Figure 2. Three Layers of Nickel Deposited on Center Anode

Although no runs were made, it is reasonable to predict that the same phenomenon will occur if anodes of different purity or of different physical characteristics are run alongside one another. Just as much care should be exercised in keeping anode rods clean and the conditions uniform on the anode side of the tank as that always given to the cathode side. It is only from a well balanced, carefully controlled plating installation that consistently good results can be expected.

Fig. 3. Backs of Anodes, Facing Tank

Artificial Abrasive

Q.—I would like to know how I could get a material that was used for polishing stove castings for a time during the World War. I do not recall ever hearing the name of this material. It was lighter in weight than emery, it seems to me, but I may be mistaken on this point. The grains were very slick and shiny, dark colored, and in setting up wheels the mass of it would give away and let the wheels sink down into it a great deal more than so much emery or other polishing material would.

Can you tell me the name of this material and where I could obtain some of it now? I have a plan of using it for another purpose than as an abrasive.

A.—You are probably referring to an artificial abrasive such as is manufactured from bauxite in an electric furnace. This is commonly used in place of emery and gives excellent satisfaction. See the "Buyers' Guide" section for manufacturers of artificial abrasives. G. B. H.

Aluminum Car Used in Record Ascent

The balloon which last month carried Professor Auguste Piccard and Charles Kipfer to an altitude of about 52,500 feet, man's highest ascent, was equipped with a seven-foot globular aluminum car. The balloonists said the car was specially constructed to withstand shocks in landing, and when it did alight no part of it was damaged. The very low temperature—76° below zero—through which the car passed when it was nearly 10 miles above the earth did not effect the metal car adversely either.

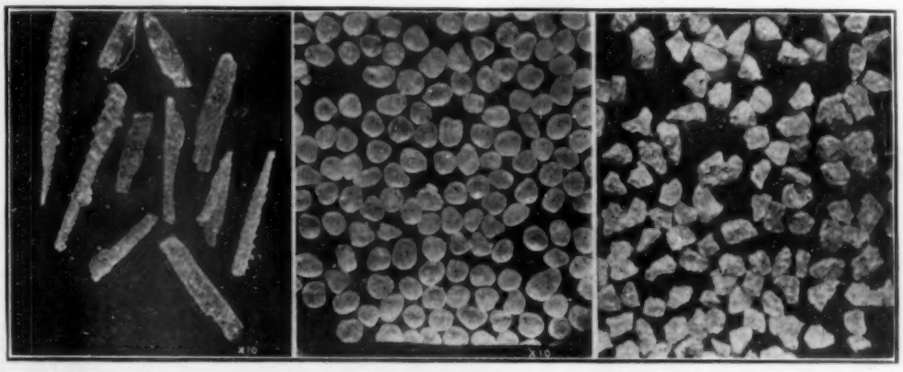
The Properties of Aluminous Abrasives

By HENRY R. POWER
The Carborundum Company, Niagara Falls, N. Y.

Improvements in the Refining and Control of Electrically Fused Alumina

THE improvements that have been made during the past few years in electrically fused alumina abrasives have brought into use new terms to describe the newer properties once thought highly technical in the consuming trade, but now a matter of both common and polite polishing conversation. Briquette Tests, Density Tests, Capillarity Tests, Penetrometer Tests, Surface Tenacity, Angularity, Capillary Value, Packing, Cubical Shape and Open Coating, are regularly discussed wherever the efficiency of a polishing room is under consideration.

Glue discussions are not so frequent, since the polisher has learned that the best quality glue properly handled must be a rigid program; that beyond good housekeeping there are few technicalities. In the matter of the abrasive, however, there has been a distinct technical improvement which has necessitated a broadening of the horizon of those using this tool of commerce. We shall endeavor in this paper to enumerate and define some of the properties of the aluminous abrasive.



LEFT TO RIGHT, FIGURES 1, 2 AND 3

1—The Weak Splintery and Platy Type Abrasive Grains

2—Round Abrasives—Devoid of Cutting Edges

3—Angular, Balanced, Well Shaped Abrasive Grains

Cubical Structure

This is synonymous with high apparent density when applied to abrasives and has been a recognized essential for several years. Electrically fused alumina when crushed, normally gives a percentage of flat shapes, thin and wide, and also slivers that are long and thin. These shapes are inefficient when used for polishing and they must be eliminated from the crushed and graded granules of the abrasive. Figure 1 shows the types referred to. In their elimination there is danger of producing an extreme product like that in Figure 2. This too round product is not satisfactory for polishing (we do not refer to buffing) where an angular sharp yet strong edge must be continuously presented to the work.

Angularity

Angularity is the term used to describe a product such as that shown in Figure 3. Here we observe an absence of the flats and splinters, a predominance of well shaped, angular grains. In order to preserve the balance between the low density splintery grains and the extremely round shapes of Figure 2, a regular test must be applied known as

The Apparent Density Test

This consists in placing a volume of grain in a vessel and jolting it a known number of times and weighing the jolted grain. From the volume and weight the apparent density is determined and set up as a control of the finishing or refining of the abrasive. The apparent density apparatus is shown in Figure 4.

In 1929 a chemical and physical treatment of the surface of the grains resulted in a new property known as

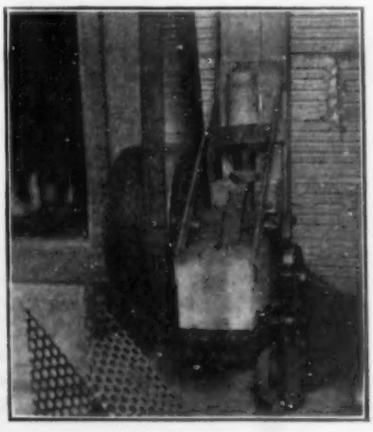


Fig. 4—The Apparent Density Apparatus

Surface Tenacity

By referring to Figures 5 and 6 this new property of surface tenacity is clearly revealed. In 5 the shiny surface of crude abrasive as made in the electric furnace is shown. This surface adheres to glue fairly well, but not as thoroughly as is necessary to get the full life out of the modern abrasive in which the internal tenacity or toughness has been highly developed. The surface had to be treated to achieve this

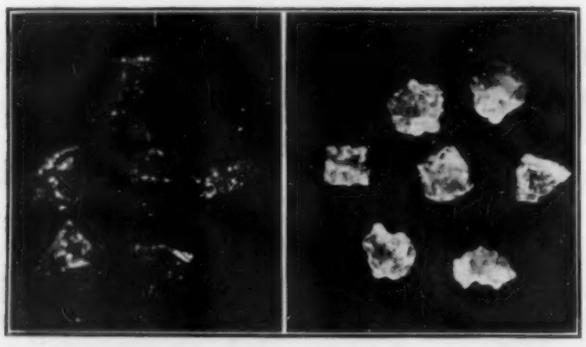


Fig. 5—Glossy or Shiny Untreated Abrasive Grains

Fig. 6—Surface Tenacity Abrasive Grains

adhesion and Figure 6 shows the recent surface tenacity abrasive resulting from the treatment.

The Briquette Test

In order to measure the success of the treatment for surface tenacity, briquettes of glue and abrasive are made up and cured for several weeks at constant humidity and temperature exactly as in testing Portland Cement. They are then pulled apart in a tensile strength machine and the pounds per square inch recorded. This value is around 1,200 pounds as against 25 per cent lesser value for shiny abrasives of the old type.

The Penetrometer Test

It has been found that the surface tenacity abrasive "packs" in the trough of the polishing room, forming a cushion for the abrasive wheel, without side slipping. This increases set up time tremendously. To measure the valuable packing property a penetrometer test has been devised as shown in Figure 7. The abrasive is jolted by hand or mechanically a definite number of times and the cone of the penetrometer is allowed to fall freely into the abrasive. The improved abrasive impedes the action of the cone much more than old time shiny slippery abrasives and this resistance is a measure of the "packing" quality.

Typical values are:	Penetrometer Value
No. 36 old time abrasive.....	256
No. 36 Surface Tenacity Abrasive	197

Each grit size has its own limits which are set and enforced in production.

Open Coating

The peculiar character of the surface tenacity abrasive, by which it conforms to the periphery of the polishing wheel as the latter is rolled in it results in a structure for the coated grains different from old time abrasives. The coating is open, there is less abrasive per unit of glue, and the polishing operation is economical because no detritus fills the open wheel, requiring less frequent dressing.

Capillarity

Capillarity is an expression used to identify what is now known as a limited property of abrasives. It measures the wetting of the abrasive with the liquid glue, but unfortunately tells nothing about the tenacity of the subsequently dried glue and abrasive. For the latter action we must make the briquette test above described.

The capillarity test does reveal, however, that the surface of the grains have grease or oil contamination which interfere with the wetting by the liquid glue solution. It is determined by allowing open tubes filled with abrasive to stand in water, vertically, and measuring the height to which the water rises in a unit length of time. The standard set for each grit size is different.

The foregoing improvements in refining and in laboratory control of the modern electrically fused alumina have been the result of close co-operation between the producer and his consuming trade. These improvements have netted upwards of 30 per cent increased production for the polisher and further refinements will be made as continued research by the electric furnace producers reveal their economic necessity.

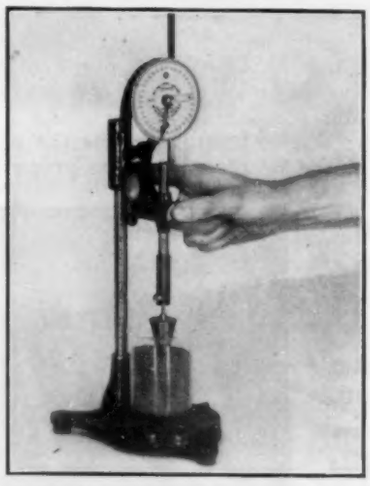


Fig. 7—The Penetrometer for Testing Surface Tenacity Abrasives

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Chromium-Gold Alloys

Q.—I should like some information covering the subject of chromium and gold alloys, especially as to the method of alloying, properties of such alloys, etc.

A.—Attempts have been made to alloy gold and chromium, and the results have been studied. However, the products have proven to be brittle and useless for ordinary purposes. The two metals are so different in their nature that when melted together the result is a brittle and practically useless mass. Perhaps in the future, when we know a great deal more about metals, we may succeed in making useful chromium-gold alloys, but the prospect is not promising.

The market is full of jewelry that is electroplated with chromium. This is a very different matter; the article is made of ordinary white gold, usually 14 karat or less, and then electroplated with a very thin deposit of pure chromium.

JEWELRY METALLURGIST.

Progress in Extruding Metals

By DR. E. PFANN

Modern High-Efficiency Hydraulic Extrusion Presses for the Manufacture of Non-Ferrous Metal Products

EXTRUSION of non-ferrous metals and alloys by means of hydraulic presses was introduced at the end of the last century. In 1894 G. A. Dick applied for patents in Germany for the first hydraulic extrusion press and for a process (known by his name) of extruding non-ferrous metal billets into rods.

The Dick-type hydraulic extrusion presses for rodding found wide application in the metal industry. The range of manufacture of the first presses was, however, comparatively small, being confined to brass 60/40; 58 per cent copper, 40 per cent zinc and 2 per cent iron; 85 per cent copper, 10 per cent zinc and 5 per cent aluminum; and 90 per cent copper and 10 per cent aluminum. These alloys were extruded into rods for the manufacture of bolts, fittings, etc.

Later on hydraulic extrusion presses were built also for the manufacture of seamless tubes and these machines were gradually developed so that they found wide application in the manufacture of all semi-finished products required in the metal industry. The possibility of producing on one press unit diversified products which differ in cross-section as much as tubular goods and window frames for instance, has, from the viewpoint of economy, given the hydraulic extrusion press superiority over other types of machines.

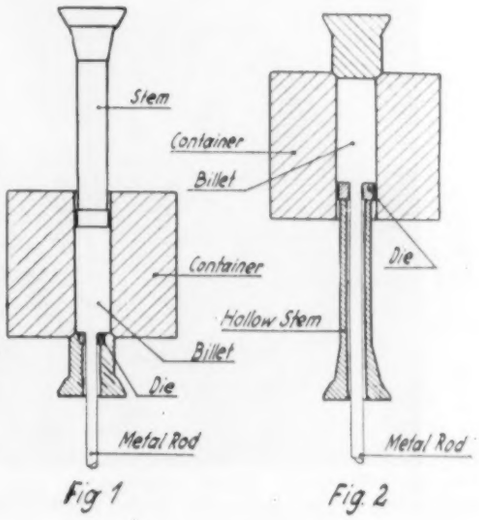
The good surface and homogeneous structure obtainable by the extrusion process created demand for such extruded sections, strip and wire as were formerly rolled. Owing to the thin wall of the extruded tubes, their high grade of concentricity and accuracy of cross section, generally, only a few finishing draws are required.

A great deal of investigation and research work had yet to be done in order to obtain a thorough knowledge of the various non-ferrous metal alloys, particularly of some condenser alloys, cupro-nickel and other special alloys. This, and the increasing demand for light metal (aluminum, duralumin, etc.) have created new uses for extruded products, and have led to further development of hydraulic extrusion presses and to their great accuracy. However, the difficulties experienced formerly in obtaining tool steels that would give consistent results in the extrusion of various non-ferrous alloys at high temperatures still prevailed, endangering the economical manufacture of a number of products.

Careful study of the conditions of flow of metal, and tool temperatures favorable to extrusion, together with a more intimate knowledge of the properties of high quality tool steel, led to the development of tools that stand up under the pressures and temperatures of extrusion. This applies particularly to the tools coming in contact with the hot billet, which are subject to wear, such as, for instance, the press stem and piercing mandrel. The scrap which, with presses of the older type, amounted to as much as 30 per cent of the weight of billet, has been reduced in up-to-date press plants to about 10 per cent to 12 per cent. Improvements of design as described in this article have further added to an increase of output; thirty to sixty operations per hour continuously for some alloys, and on medium sizes of tubing even eighty operations per hour, so that up to date extrusion plants are being operated at a minimum of manufacturing cost.

Mode of Operation

The extrusion of non-ferrous metals on hydraulic presses is performed in the following manner:



Figs. 1 and 2—Diagrammatic View of the Direct and Inverted Methods of Extrusion

A solid non-ferrous metal billet heated to the requisite temperature is placed into the container which is closed at one end by a die having a suitably shaped bore. From the other open end of the container, a disc is forced against the metal billet by the action of the hydraulically operated press stem, so that the metal is squeezed through the die located at the other end of the container (Fig. 1). When extruding tubes, the billet inserted in the container is first pierced by the piercing mandrel. The mandrel is then further advanced into the die, where it forms a circular opening between die and mandrel into which the plastic metal is forced by the action of the press stem. Before the metal flows the billet is thoroughly compressed, ensuring a homogeneous structure of the product.

This is the normal or direct method of extrusion which is almost generally applied. There exists another method, known as the indirect or inverted method, sometimes used for the manufacture of rods. In the direct method, the die is arranged stationary at the side of the container that is farthest away from stem, whereas in the inverted method it is attached to the hollow stem and penetrates into the billet placed in the container. The billet is extruded through the hollow stem (Fig. 2). The design of the first "Dick" press already permits working both by the direct and by the inverted method. However, extrusion presses were developed almost exclusively along the lines of the direct method.

of normal brass in an 8-hour day. When extruding rods and sections, which permit using billets of greater length, about 55,000 lbs. of normal brass tube can be extruded on this press in an 8-hour day. The development of the light metal industry, and the ever increasing demands of such metals during the past few years have led to the manufacture of heavy extrusion presses, ranging from 2,500 to 5,000 tons pressure. Fig. 3 illustrates a hydraulic extrusion press of 3,350 tons pressure. This press, which may serve equally well for the extrusion of copper, brass, condenser alloys, aluminum and duralumin, is capable of taking billets up to 16 in. in diameter by 35 in. maximum length. Its wide range of manufacture,

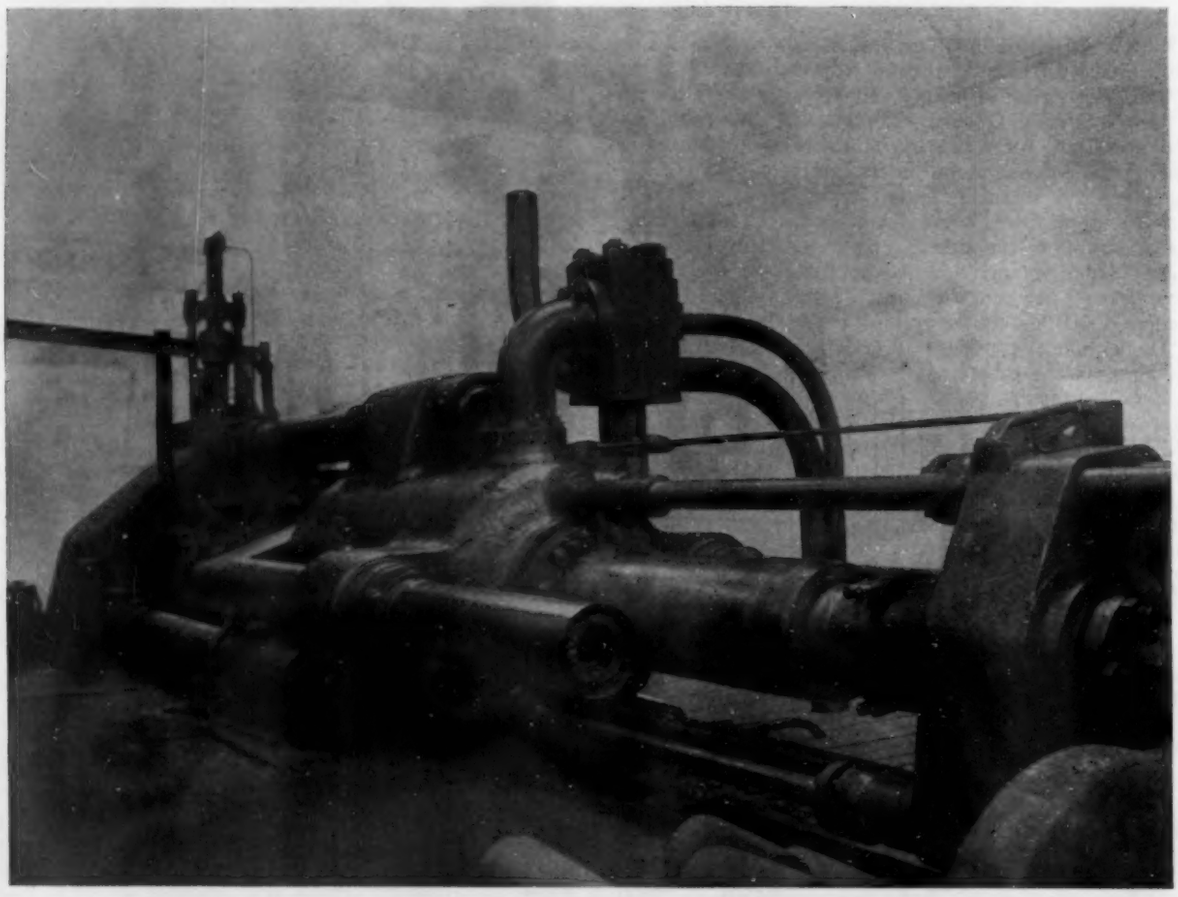


Fig. 3—3,350-Ton Schloemann Hydraulic Extrusion Press for Tubes and Rods

Design of Extrusion Presses

Hydraulic extrusion presses are built for various sizes depending upon the output and the product to be obtained. Tubes of small diameters are preferably extruded on vertical extrusion presses, ranging from 600 to 1,000 tons pressure. The extruded product passes through the hollow base of the vertical press into a bent channel below the floor towards one side of the press. Horizontal extrusion presses are preferably used when there is a wide range of manufacture to be dealt with. These presses are generally built for pressures of 750, 1,000 and 1,500 tons. A 1,500-ton horizontal extrusion press is capable of turning out about 33,000 lbs. of tube

which comprises all kinds of semi-finished products for the non-ferrous metal industry and the exacting requirements as to concentricity, surface finish and homogeneous structure is the result of careful study and research which developed a machine embodying the following outstanding features:

The patented method of supporting the container, so that permanent alignment of the axis of the container with that of the stem and piercing mandrel is insured, unaffected by the temperature of the container. This feature is indispensable for the extrusion of concentric tubes.

The patented centrally arranged piercer, the movement of which is entirely independent from that of the ram.

The arrangement of the tools in such a way that quick

and easy changes of the die are possible, thereby increasing the output of a large variety of products.

Specially designed control gear to permit operating the press easily and sensitively by means of a hand lever, and to adapt the working speed of the press to the requirements of the alloys to be extruded.

The press is equipped with hydraulically and automatically operated auxiliary devices, insuring safe and quick operation.

The press shown in Fig. 3 is suitable for the manufacture of rods, sections, strip up to 14" wide, and wire in one or several strands having a minimum diameter of from ¼" to $\frac{5}{16}$".

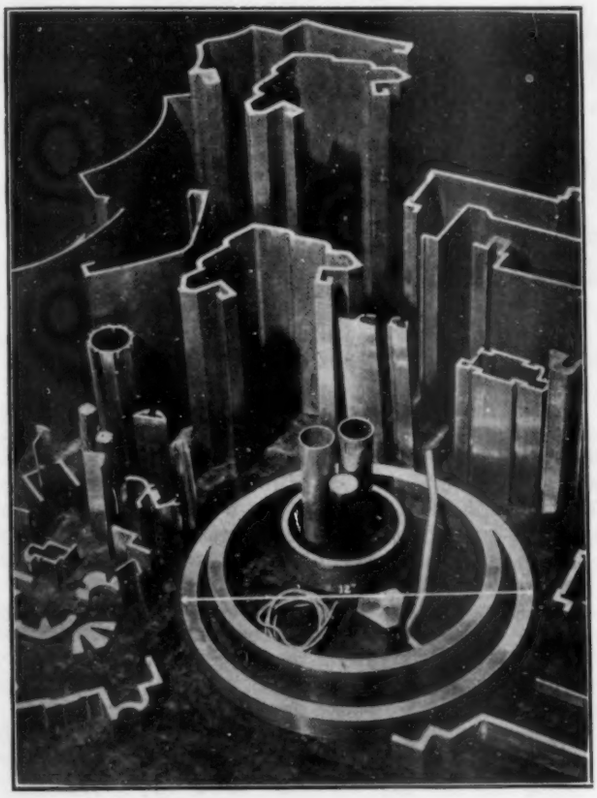


Fig. 4—Examples of Extruded Products

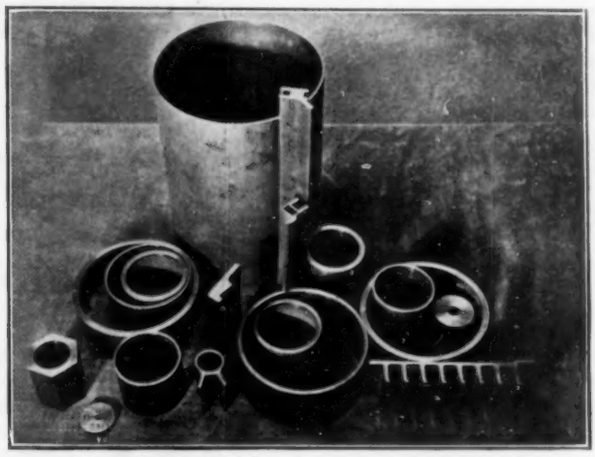


Fig. 5—Further Examples of Extruded Shapes

In Figs 4 and 5 are shown a variety of shapes, of which the larger ones are products extruded on this press by one of the largest aluminum manufacturers in the world.

All these products, also the most intricate sections, have a good surface and are extruded accurately to size; in many instances they do not require subsequent drawing.

Survey of Progress in Metals

At a meeting of the New York Metropolitan Section of the American Society for Testing Materials, Dr. Paul D. Merica, director of research of the International Nickel Company, New York, gave an excellent survey of the progress that has been made in non-ferrous metallurgy, and the situation in the non-ferrous industries as a whole, as regards research and other aspects related to its advancement.

Great advances have been made in the non-ferrous metals industry, as outlined by Doctor Merica. This is emphasized by the relative increase in the use of non-ferrous metals as compared to the increase in the consumption of pig iron and steel. In many instances they show superior properties for certain local applications, and have been brought down to a price range which insures economic utilization of these alloys. They are finding increased application due to superiority in service or appearance, for example, copper and brass pipe are finding increasing use in residences, replacing the iron and steel pipe formerly used. Similarly a large volume is used for plating surfaces to enhance the appearance and to give better resistance to corrosion.

Much of the increased use of non-ferrous alloys is due to serviceability, as a result of developments that have taken place in recent years. Aluminum and other light alloys, for example, have been developed of great strength, and many branches of the transportation industry are now utilizing these alloys, such as the automotive, street and steam railway, etc. They are of special importance in aircraft, and it is in this industry where they find their greatest use.

Doctor Merica concluded with a discussion of the dispersion phenomena which increases the hardness of certain metals and improves their physical properties at the same time. He stated that this important development of recent years, in addition to its application in non-ferrous metals, would find increased use and could be applied to hardening ferrous alloys.

Cement for Metals

Q.—Can you tell me anything about an adhesive known as "pearl cement," which is said to be very good for use on metals in ornamental work?

A.—There are numerous cements for making ornaments adhere to flat metallic surfaces. They are marketed under various trade names. A cement that can be used for sticking glass to brass, or brass to brass, is made as follows: caustic soda, 1 part; resin, 3 parts; plaster of paris, 3 parts; water, 5 parts; boil these together and allow to cool before using. The cement sets in about 20 minutes.

P. W. Blair.

Die Pressing Brass and Copper Alloys

By JOHN R. FREEMAN, Jr.

American Brass Company, Waterbury, Conn.

Methods, Equipment and Alloys Used in This Process. Die Design for Various Types of Work. A Wide Variety of Shapes Can Be Made.

A PAPER READ AT THE NEW YORK MEETING OF THE INSTITUTE OF METALS DIVISION, FEBRUARY 18-19, 1931.

THE die pressing of brass may be described as a method of producing irregularly shaped parts of brass and other copper alloys by hot deformation in a die under pressure. Die pressing of brass was first developed as an improvement on sand castings in order to obtain irregularly shaped articles of brass with superior surfaces, a closer tolerance in dimensions, a denser structure, freedom from porosity and elimination of the relatively large amount of scrap invariably attached to sand castings. The freedom from sandy surfaces with consequent greater tool life in machining operations was also

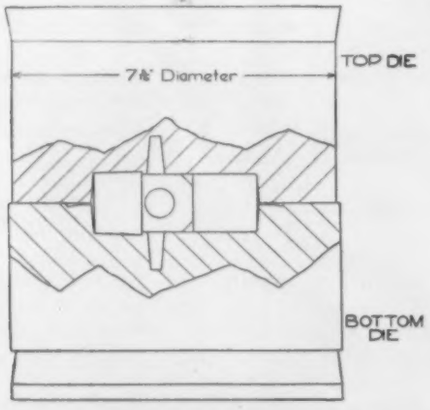


Fig. 1—Two-Piece Die for Pressing Brass Valve Body Shown in Fig. 8

recognized as well as elimination of losses due to the uncovering of blowholes in machining operations. Die pressing also gave alloys of superior strength.

Die pressings today are made from extruded rod or shapes, according to design of the part to be made. The greater number of pressings are made from round rod, because of its relatively lower cost and ease of handling. The rod is first sheared or sawed into desired lengths, the diameter of rod used and length of "slug" or "rivet" depending upon ultimate weight and shape of the die-pressed part to be made and design of die. The dimensions of the slug are figured so as to give the minimum amount of scrap to be sheared from the pressing as it comes from the die.

Extruded shapes having I, T or X sections are often used when the finished part is to have a similar shape or heavy sections are joined by relatively light sections of considerable length. A rod bent in the shape of a U is also used on occasion, for similar reasons.

Proper shearing of the slugs is of considerable importance. The sheared ends of the slugs should be as flat and straight as possible. Improperly sheared ends having an angle to the axis of the bar or a rough, uneven surface are liable to give folds or laps in the finished pressing and proportionately high rejections. The property of shearing varies considerably with different alloys and should be considered in the selection of a material for a given part. Where satisfactory shearing is not possible, the slugs may be cut from the bar by power saws. Extruded shapes are generally sawed to length. Shearing is obviously preferable because of greater speed and no waste of metal.

The die pressing of the slug to desired shape usually is carried out in either a drop, crank or screw press. The drop press is preferred because of its greater speed of

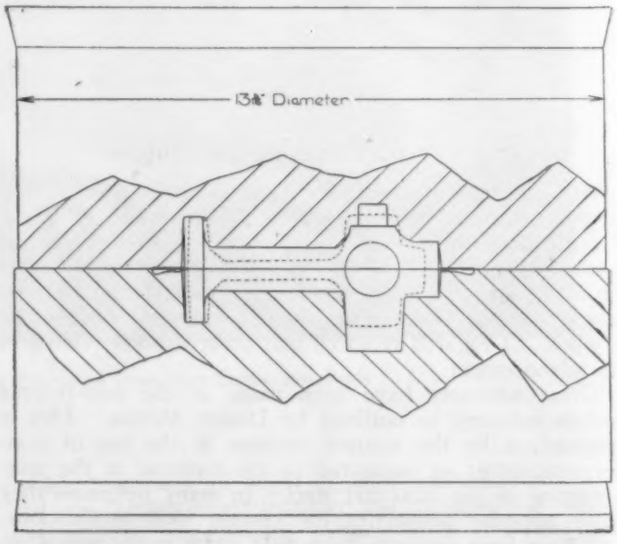


Fig. 2—Two-Piece Die for Pressing Brass Valve Body Shown in Fig. 8, Illustrating Use of Extruded Shape Indicated by Dotted Lines

operation and is almost always used for making small parts. Its use is primarily limited by the capacity of the hammer. The screw press (air controlled) is generally used for the forming of larger parts; also for some alloys and shapes the relatively slower flow of the metal in the dies and extrusion action of the press is preferable. Presses of 250 up to 800 tons capacity are now used.

The design of dies is of major importance. For most work two-piece, so-called "open" dies, are used; Figs. 1 to 4 show design of die used for making parts shown as *A* and *B* in Figs. 8 and 9.

Die design is based primarily on experience. When possible the upper die is designed to act as a ram to force the metal to flow into the cavities in the lower die that give the desired shape to the metal. This places the greater wear on the lower die; consequently the upper die

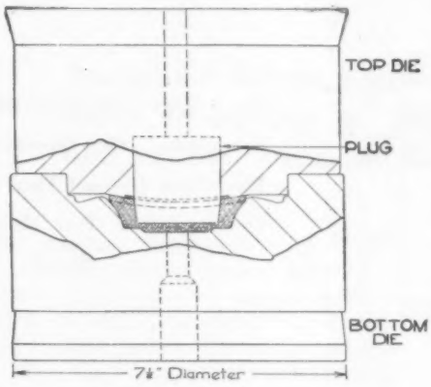


Fig. 3—Two-Piece Die with Plug for Forming Everdur Spud Shown in Fig. 9

has a longer life, which necessitates less frequent replacements of the latter and often permits use of a less expensive steel in the upper die. The draft in the upper and lower dies is generally adjusted so that after forming the part will pull free from the upper die and remain in the

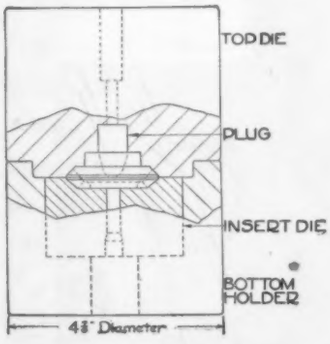


Fig. 4—Two-Piece Die with Plug and Insert Die for Forming Brass Gear Shown in Fig. 9

lower one, to permit quick and easy ejection by the knockout pins in the bottom of the lower die. The draft will vary from 1° to 5° according to design. In addition to proper draft, a flash clearance of 0.023 to 0.080 in. must be allowed, according to design of part, as well as proper allowance for thermal shrinkage of the metal, usually

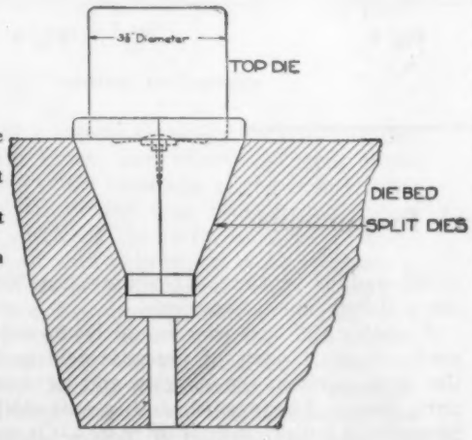


Fig. 5—Split Die for Forming Part Having Undercut Portion as Shown in Fig. 9

about 0.012 in. Die-press pieces having straight holes with approximately parallel sides may be made under certain conditions. Parts to be made in two-piece dies necessarily must be free from undercuts.

When the design calls for recessed or offset portions in such a position that they cannot be placed at the parting line of a two-piece die, a split die is used. The design of such dies is similar to two-piece dies except that the lower die is split vertically and fits into a tapered die bed of 25° angle, so that when pressure comes against the bump the dies are held firmly together. After the press reverses, an automatic knockout raises the split dies against a stop which opens the dies and permits easy ejection of the parts. The split dies then drop back into original position. A die of this type is shown in Fig. 5; the part formed is marked *C* in Fig. 9.

A third type of die generally referred to as a three-piece die, or an "extrusion" die, is shown in Fig. 6. It is

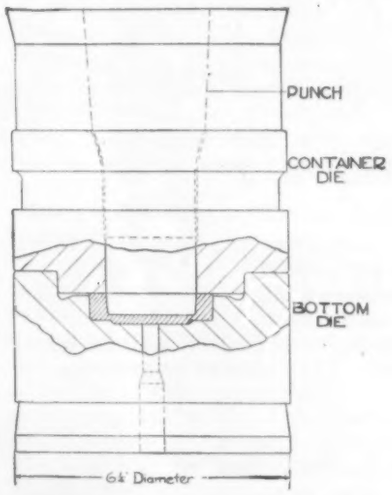


Fig. 6—Three-Piece Die for Forming Ring Shown in Fig. 9

made up of three parts, the bottom die and the upper die block which consists of two parts, the container die and the punch. In operation the container die first closes into the recess in the lower die. The punch then is forced further down, forcing or "extruding" the metal slug into the cavity. A die pressing formed in this type of die is shown at *D* in Fig. 9.

The principal cost of die pressing is the initial cost of dies and their service life. The number of parts obtained from a set of dies depends on many factors. Parts requiring relatively long thin walls with sharp corners and considerable flow of metal are especially severe, causing early checking of the die. Die life is also limited by the dimensional tolerances required, a close tolerance causing earlier discard of the die. In general, a tolerance of ±0.010 in. is preferred, but a tolerance of ±0.005 in. can readily be maintained. A die usually is designed so that when new the part will be slightly undersized and as the die wears the part will approach the maximum permissible dimensions. An average of about 30,000 parts may be expected from a die.

Die pressings are preferably made in one operation but in some cases the slug may be given a preliminary forming operation, then reheated and finished in a second pair of dies. For example, it is sometimes simpler and more economical to give a round slug a preliminary forming operation than to use an extruded shape, or it may be simpler for parts requiring considerable depth of flow of metal into the die to carry out the operation in two steps. A die for the latter type of work is illustrated in Fig. 7 and part formed at *C* in Fig. 8. In this case the slug as sheared from extruded rod is given a preliminary

forming in a container die. The flash is then removed, the part reheated and given its final form in the finishing die. The use of two operations for forming this pressing avoids folds in the metal and gives greater tool life.

The temperature of pressing will vary with the alloy and must be adjusted between too high a temperature, which will burn the metal, and too low a temperature, which will prevent the metal from filling the die. In the heating, scaling must be avoided. Scale gives a poor surface to the part, prevents filling of sharp corners and causes excessive wear on the dies.

After forming the flash is trimmed off and the center punched out if required. The sides, as in nuts, may be trued up if required, by a light broaching operation, which consists essentially in removing the draft angle. The die pressings are given a sulfuric acid and bichromate pickle to remove superficial scale, then are washed, dried and packed for shipment.

Die pressings are made of most all of the copper-base alloys. The greater number are made of leaded high brass (about 60 per cent. copper, 2 per cent. lead, balance zinc) because of its good forging characteristics and excellent machining qualities. Large numbers are also made of the aluminum bronzes, manganese bronze, Tobin bronze, nickel silver and some have been made more recently of Everdur.

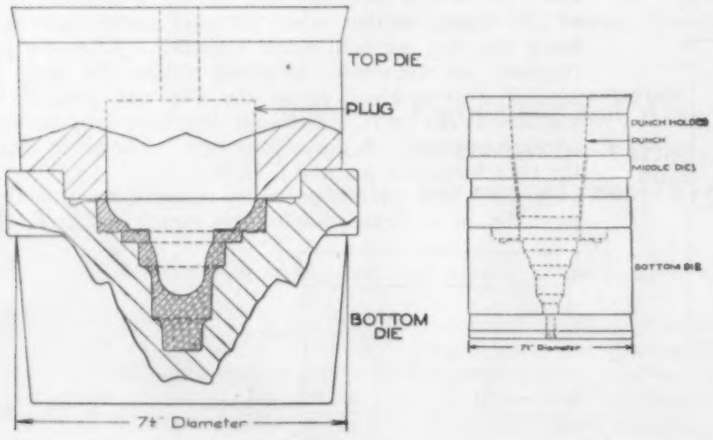


Fig. 7—Dies Used for Forming Part in Two Operations. First Operation Is Done in a Three-Piece Die and Final Operation in a Two-Piece Die. Part Made is Shown in Fig. 8

Fig. 8—Die Pressings. A. Brass Valve Body Made in Die Shown in Fig. 1. B. Brass Valve Body Made in Die Shown in Fig. 2. C. Part Formed in Two Operations

Fig. 9—Die Pressings. A. Everdur Spud Made in Die Shown in Fig. 3. B. Brass Gear Made in Die Shown in Fig. 4. C. Part Made in Die Shown in Fig. 5. D. Ring Made in Die Shown in Fig. 6

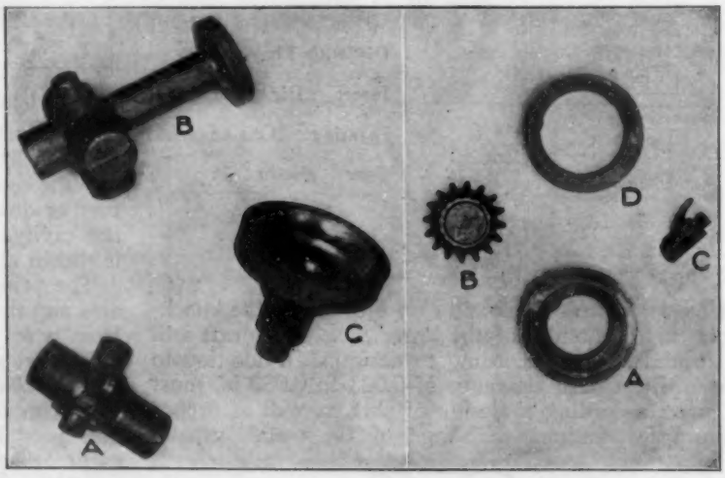


Fig. 8 **Fig. 9**

Cleaning Musical Instruments

Q.—Will you be kind enough to let us know what mixture of acid or cleaning solution is best for cleaning brass articles such as cornets, trumpets and other musical instruments which have been stained and corroded from saliva?

A.—A mixture of sulfuric and nitric acids in the proportions of 2 parts of sulfuric acid to 1 part of nitric acid can be used to brighten the brass. If the acid mixture is allowed to remain on the brass too long it will spoil the polished finish, however.

Probably the best way would be to use a muriatic dip made of equal parts of muriatic acid and water. Place the brass parts in the solution and let them remain there until clean. Then, polish with a soft cloth using a good commercial polishing fluid or paste.—OLIVER J. SIZELOVE.

The Foundrymen's Convention in Chicago

By H. M. ST. JOHN
Associate Editor

Practical Problems Featured in Papers and Round Table Discussions at the 35th Annual Convention of the American Foundrymen's Association

THE presidential address, delivered by President N. K. B. Patch at the opening general meeting on May 4th, sounded a keynote which expressed to a marked degree the spirit and the material accomplishments of the American Foundrymen's Association's thirty-fifth annual meeting. Mr. Patch's point was that technical and trade associations in general and the American Foundrymen's Association in particular should concentrate their energies on service to their existing memberships by correlating and disseminating all available information which applies particularly to the field served by the association. Efforts to increase the membership of an organization by extending the field of its activity outside of its natural sphere are almost certain to decrease the benefits accruing to that portion of the membership within the natural sphere.

N. K. B. PATCH, Secretary of Lumen Bearing Company, Buffalo, N. Y., and a Former President of the A. F. A., Was Elected a Director This Year

Practical Questions Predominate

The advantages of a systematic policy, of the character outlined by President Patch, were clearly apparent in the technical sessions and other meetings of the Non-ferrous Division. An analysis of the nine non-ferrous papers formally presented discloses the fact that three of these were largely concerned with gating and molding practice. This subject, which has been discussed from all imaginable angles ever since foundrymen learned to talk, also came in for a good deal of attention at the Non-ferrous Round Table luncheon and was the principal subject of the Non-ferrous Shop Operation course for three sessions, each more than an hour long. One might imagine that so hackneyed a theme would be tedious but this was far from being the case. The various speakers succeeded in throwing new light on an old subject and were rewarded by the eager interest of their audiences. It was an excellent example of what can be accomplished by careful, painstaking study of fundamentals in a field which has received much superficial attention.

Gating and Molding for Bronze and Aluminum Castings

The paper entitled "Bronze Pressure Castings" by J. E. Crown described the making of large bronze castings, weighing as much as 2,000 lbs. and designed to stand 300 lbs. hydraulic pressure after machining. One such casting, 21 inches in diameter and 10 feet long, cast on end, was supplied with metal from a circular runner and shower gates at the top of the casting. Despite the distance traversed by the metal in falling from the runner to the bottom of the mold this method was found to produce the most satisfactory castings. It is evident that the evil results of splashing and agitation of the metal in the mold have sometimes been exaggerated. The same method has been applied, at the U. S. Naval Gun Factory, to other difficult castings with excellent results.

Lewis H. Fawcett, also of the U. S. Naval Gun Factory, presented a paper on "Molding Practice for Heat-Treated Aluminum Alloy Castings." This was concerned primarily with copper-bearing aluminum alloys which, because of their high solidification shrinkage and hot shortness, present more than the usual number of difficulties. One of the most interesting points brought out may be quoted from the paper, as follows: "As a general rule, gates should be designed so that the sprues enter the smaller cross-section rather than the larger

FRED L. WOLF, Technical Superintendent, Ohio Brass Company, Mansfield, Ohio, Another Non-Ferrous Foundryman Who Became a Director of the A. F. A. This Year

cross-section of the casting. By this means the hot metal will be cooled by passing through long, thin sections before it reaches the larger section, resulting in a more uniform grain size throughout the casting."

A year ago W. F. Graham and L. A. Meisse made a novel contribution in their paper on the application of the deep-etch test to brass. This year the subject was further developed by R. W. Parsons, of the Ohio Brass Company, in a paper, "Deep Etching of Brass Applied to Gating Problems." A study was made of the gating of test bars, in particular, and the behavior of the metal in the test bars, the gates and the sprues was brought out graphically by deep etching. Possibly no clearer demonstration of test-bar inconsistency and the reasons for it has been made. The same principle applied to an investigation of gating difficulties in troublesome castings was equally fertile in results.

At the first session of the Shop Operation course C. M. Saeger, Jr. of the U. S. Bureau of Standards, and E. J. Ash, the Association's research associate at the Bureau, collaborated in an exposition of methods which have been developed at the Bureau for the study of fluidity and shrinkage as factors affecting gating. This work has given the foundryman fundamental information, hitherto lacking, and has supplied him with tools for the further investigation of what has been a very obscure and controversial matter. Later sessions of the course included "Gating Practice with Reference to Aluminum Bronze, Manganese Bronze and Yellow Brass," led by P. E. McKinney of the Bethlehem Steel Company, and "Gating Practice as Related to Red Brass and Aluminum Alloys," with Wm. Marr and R. W. Parsons, of the Ohio Brass Company, leading the discussion on red brass, and J. W. Collins, of the Aluminum Company of America, the discussion on aluminum.

The three shop operation sessions attracted an average attendance of about 60. Coming at the end of the day, as they did, the enthusiastic interest shown in the discussions was really quite remarkable.

Permanent Molds for Bronze

Henri Marius (THE METAL INDUSTRY's prize winner for 1930) presented a paper on "Permanent Mold Foundry Practice for Bronze Castings," which, in the absence of the author, was read by R. W. Parsons. The production of brass and bronze castings in molds other than sand is a matter in which progressive foundrymen are necessarily much interested. The present trend toward molds of metal and other semi-permanent materials is too marked to be ignored. Mr. Marius' paper described very fully the methods used in making railroad castings, poured by gravity into iron molds.

Cupola Melting of Brass

Another comparative novelty in the foundry is the brass-melting cupola. A paper by T. Mauland, of the International Harvester Company, was entitled the "Cupola Melting of Brass." The paper aroused a good deal of discussion and brought out the fact that quite a number of brass foundries are using these cupolas with satisfactory results. The paper in question mentioned the advantages of the cupola as rapid and economical melting, hot metal, good working conditions, low melting loss, a good quality of molten metal and the ability to melt efficiently, turnings and metal-bearing wastes. The author did not recommend the cupola for melting alloys high in zinc.

X-ray Examination of Castings

Methods of testing castings have received increasing attention in recent years. Of these, the use of the X-ray in determining the soundness of castings has held a prominent place, particularly with reference to aluminum castings. E. M. Gingerich and H. J. Rowe, of the Aluminum Company of America, presented a paper on the "X-ray as Production Tool to Improve Quality of Aluminum Alloy Castings." Once more attention was called to the subject of gating when it was pointed out by the authors that the X-ray offers a convenient and effective means of locating defects due to improper location and design of gates. The method has the obvious advantage that it is not destructive to the casting tested, but a good deal of experience and skill is required for its effective use, particularly in the case of intricate castings.

Nickel in Brass

There was a time, not so long ago, when nickel was supposed to be an undesirable impurity in foundry bronzes. More recently it has been learned, and is now rather generally accepted, that small percentages of nickel (of the order of 0.5 to 2.0 per cent) are actually beneficial in many cases. A paper entitled "Some Effects of Nickel on Bronze Foundry Mixtures," by N. B. Pilling and T. E. Kihlgren, of the International Nickel Company, described a series of tests designed to show the influence of nickel, in quantities up to 3 per cent, on a number of common bronze mixtures. The effect of pouring temperature was also discussed and it was brought out in the discussion of the paper that, in small percentages, nickel, in spite of its high melting point, actually increases the fluidity of many bronzes and lowers the temperature at which they can be poured into sound castings. The best proportion of nickel to use varies considerably, depending upon the nature of the original alloy.

Foundry Costs

A session on non-ferrous foundry costs had, as its principal feature, a paper on "The Averaging of Costs and Its Influence on the Profit and Loss Statement," by E. A. Baker, of Ellery A. Baker & Company. The general discussion resembled similar discussions in the past in that there was a good deal of difficulty in arriving at a common basis for discussion. It is noteworthy, however, that progress is made from year to year, and there is some prospect that brass foundrymen will eventually approach an agreement on the principles and methods underlying this important subject.

Non-Ferrous Round Table

The Non-ferrous Round Table has already been mentioned. This function has become a popular and important feature of every Foundrymen's Convention. This year's Round Table, under the able leadership of H. F. Seifert, of the Westinghouse Electric & Manufacturing Company, attracted an attendance of 90, and included a confidential discussion of a great variety of things which combine to make a foundryman's life interesting.

A number of papers in sessions other than non-ferrous were of general interest, notably several excellent papers on synthetic sand, sand control, etc. The brass foundryman continues to be rather apathetic on this subject but there was non-ferrous attendance both at the sand session and at the Shop Operation Course on Foundry Sand.

Non-Ferrous Advisory Committee Work

No detailed account can be given of the many committee meetings held but the meeting of the Non-ferrous Advisory Committee deserves a word of mention. The work of this committee is concentrated on the correlation of non-ferrous activities, so that each benefits by the work of the other, contacts with other organizations having similar interests, and, finally, collecting, classifying and disseminating all sorts of information of interest to the non-ferrous foundryman. One definite instance of this activity was evident in the Report of the Non-ferrous Committee on Recommended Practices, presented by Chairman Ball at one of the non-ferrous sessions. The report comprised a tentative formulation of recommended practices relating to the alloys: copper 85, tin 5, lead 5, zinc 5; copper 80, tin 10, zinc 10, and manganese bronze.

Among the events of general interest during the week was the Exchange paper from the Institute of British Foundrymen, "Some Notes on the Structure of the British Foundry Industry," by V. C. Faulkner, Editor, Foundry Trade Journal, London. Mr. Faulkner stressed the influence of free trade and a large export business on the character of British foundries.

Business Session and Banquet

Both the exhibitors' dinner and the annual banquet were well attended. At the latter Hugh Morrow was toastmaster and Dr. William S. Sadler, of Chicago, the principal speaker. Fred Erb, a recent president of the Association, made the presentation of the Whiting medal to Ralph S. MacPherran, of the Allis-Chalmers Manufacturing Company, citing him for his achievements in the gray iron industry.

At the annual business meeting of the Association the following officers and directors were elected:

President: E. H. Ballard, Foundry Superintendent, General Electric Company, West Lynn, Mass.

Vice-President: T. S. Hammond, President, Whiting Corporation, Chicago, Ill.

Directors: N. K. B. Patch, Secretary, Lumen Bearing Company, Buffalo, N. Y.; W. D. Moore, President, American Cast Iron Pipe Company, Birmingham, Ala.; F. L. Wolf, Technical Superintendent, Ohio Brass Company, Mansfield, Ohio; D. M. Avey, Editor, Foundry, Cleveland, Ohio; A. G. Storie, Vice-President, Fittings, Ltd., Oshawa, Ont.

Both the Convention and the Exhibition must be rated as successes, rather astonishingly so when one considers the generally depressed condition of foundrymen and others. Upward of 3,300 members and guests were registered; over one-third of the entire A. F. A. membership was registered. One hundred seventy exhibitors occupied 25,300 square feet of floor space. The registration at the Convention, the number of exhibitors and the space occupied by the Exhibition, all exceeded similar figures for the Convention held at the same place two years ago. The facilities of the Stevens Hotel for accommodating all activities in connection with the meeting under one roof, undoubtedly helped to produce so successful a result.

The technical meetings were exceedingly well attended; the Exhibition was fairly well attended. Some exhibitors reported very satisfactory results, others were inclined to think that the technical meetings had stolen their crowd. A certain amount of competition between meetings and Exhibition is unavoidable, which is both fortunate and unfortunate. Possibly those exhibitors fared best who recognized the necessity of giving a demonstration so significant and vital that it could not be overlooked or ignored.

The Rust Proofing of Iron

METHODS of producing a coating upon the surface of iron or steel for protection against corrosion may be divided into two classes: the chemical method and the heat treatment method.

Chemical Methods

With the chemical method there is produced upon the surface of the iron some form of oxidation that protects the metal, or a deposit of another metal which does likewise. Of the different metals that are deposited, zinc and cadmium give the best results when equal thicknesses of the metals are deposited. Of these two metals cadmium undoubtedly gives better protection, but the cost is somewhat greater due to the difference in price of the metals.

Another chemical method is the Parker process, and this produces upon the surface of the iron an insoluble phosphate. In this process, the iron is placed in a weak solution of iron phosphate and kept boiling until the chemical action has been completed. The color produced is a dark gray which is improved by oiling.

The process is licensed by the Parker Process Company, and solution and chemicals are furnished with directions for use.

Heat Treatment Methods

Of the heat treatment methods, the Bower-Barff process is by far the best. With the Bower-Barff method the finish, which is a protection against corrosion, also presents a very pleasing appearance. The process consists of placing the steel or iron in an oven heated to 1,500° F., and then injecting steam into the oven. A black oxide of iron is formed, and when the work is oiled, it presents a very pleasing rust proof finish.

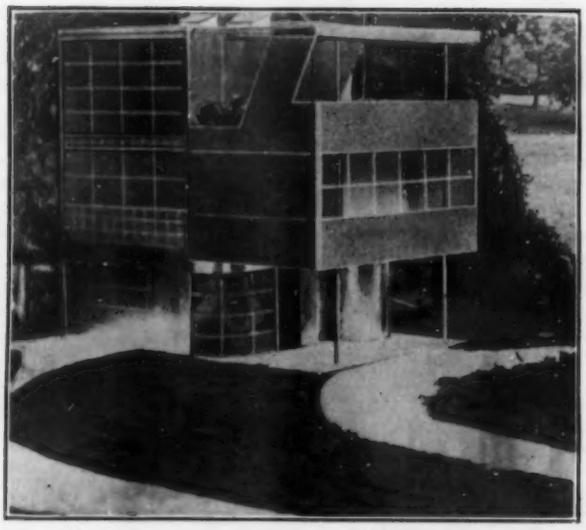
A blue black is also produced by dipping the work in a molten sodium nitrate bath, but this finish is not rust proof. Oiling the work helps to prevent corrosion.

Other methods of producing rust proof finishes on iron, or steel are by colorizing and sherardizing. They consist of coating the metal with finely divided particles of aluminum or zinc, respectively, and heating in a furnace until there is formed a bond between the finely divided metals, and the iron or steel.

Still another method of protecting metals from corrosion is by the use of the Schoop spray gun. This method consists of the spraying of any metal in a molten condition upon the surface of another metal. The use of this method is not limited to the covering of metals alone as it is applicable to practically any object.

OLIVER J. SIZELOVE.

Nonferrous Metals in Unique Forms



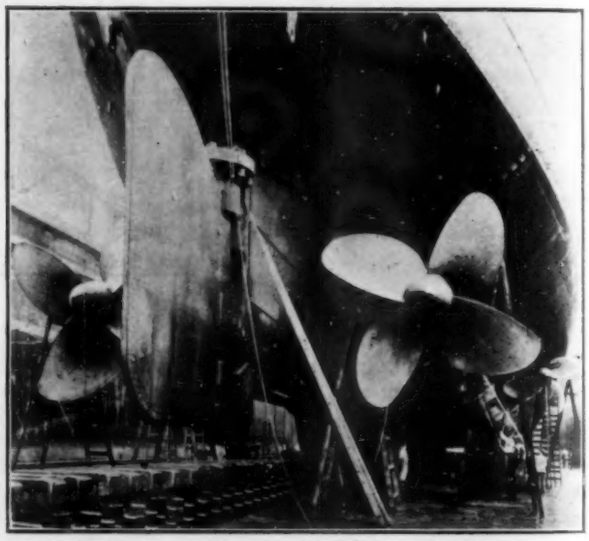
First American All-Metal House

WIDE publicity was recently given to this metal and glass house, which was shown at the Architectural League Show in New York. At the show, the house was erected in full size, from plans of the architect, A. Lawrence Kocher, in slightly over a week. It is the first American "all-metal" dwelling. It has a frame of aluminum alloy and steel, and walls of three-inch insulation covered with finely corrugated aluminum sheets supported by slender columns of aluminum. The corrugation of the outer surface eliminates sun glare. There are large areas of glass on all sides of the house, to provide a maximum of light by day. For night illumination, neon lights are used, with special chromium plated reflectors.

The general layout is very unusual. There is no cellar; a garage, and the heating plant and other facilities usually found in basements are on the ground floor. In the house there is considerable aluminum and glass cabinet work.

World's Largest Bronze Castings

THE largest single bronze castings ever founded form the basis of a world record in metal claimed by the Canadian Pacific line for its 42,500-ton ocean greyhound, the new "Empress of Britain." The castings are two inboard propeller screws, weighing approximately 25 tons, with a diameter of 19 feet 3 inches. The two outboard propeller screws are not exactly playthings either, even if they seem small by comparison, weighing 17½ tons each and measuring 14 feet across. The inboard propellers flank the rudder in the picture. Now these castings are driving the 42,500-ton liner at 30 miles an hour between Southampton and Quebec.



Working Ferro-Cerium

Q.—HAVE you any data on drawing or extruding ferro-cerium into rods approximately ⅛ inch and ¼ inch in diameter?

A.—Careful search fails to uncover any production of this material by mechanical means. The United States Bureau of Standards submits the following data:

"Very little information is available on the production of this alloy, except that a complicated combination of chemical and electro-chemical processes are used which are covered by patents.

"Cerium in the form of oxide is used in the Welsbach incandescent gas mantle as an addition, in amounts of 1 or 2 per cent, to the thorium oxide which constitutes the major portion of the mantle.

"This Bureau has no information that cerium has been used in the filaments of incandescent electric lamps.

"The largest consumption of cerium and the cerium earth metals, ordinarily known as 'Misch' metal, is probably by the pyrophoric alloy industry for use in the well known gas and cigar lighters. The sparking material of these devices is usually an alloy consisting of about 35 per cent of iron, and 65 per cent of the Misch metal (cerium, lanthanum, neodymium and praseodymium, and samarium), known as "Auer metal."—W. J. PETTIS.

THE METAL INDUSTRY

With Which Are Incorporated
The Aluminum World, Copper and Brass, The Brass Founder and Finisher, The Electro-Platers' Review

Member of Audit Bureau of Circulations and The Associated Business Papers

Published Monthly—Copyright 1931 by The Metal Industry Publishing Company, Incorporated; Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress, March 3, 1879

SUBSCRIPTION PRICE, $2.00 Per Year. SINGLE COPIES, 20 CENTS. Please remit by check or money order; Cash should be Registered. Advertising Rates on Application. Forms Close the First of the Month.

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Vol. 29 New York, June, 1931 No. 6

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Editorial

Advice From Leaders

BESET as we are on so many sides, we must almost feel that we should like to be rid of what seems to be only another evil, our business prophets and forecasters. At heart, of course, we know that an honest expression of opinion from a reputable source is not only valuable but almost indispensable, particularly in times like these when we need guidance. We have, however, been subjected to such a flood of prophecies, analyses, interviews, advice and opinions that we hardly know which way to turn. We are still asking, "What went wrong?" and since this question has not yet been answered to the satisfaction of everyone, it is needless to say that we have been unable to find the answer to the question, "How shall we correct it?"

From the record of past depressions and their average duration (about eighteen months) we should be at the beginning of the upturn. Unfortunately, averages cannot be trusted to repeat in every specific instance. We are told by the famous economist Professor Seligman, that there is nothing fundamentally wrong with our present structure. "We are just in the first stages of capitalism. All we need is a strengthening of a sense of social responsibility." This point of view seems to be taking hold firmly. According to an analysis of a survey by the McGraw-Hill Publishing Company which was answered by 800 heads of American businesses, manufacturers admit the need for stability of employment and the continued improvement of American standards of living based on high wages and high productivity. The depression has been attributed to over-production caused by the great expansion of installment selling, but we are told in no uncertain terms by E. C. Vogel of the Commercial Investment Trust Company that installment selling is an essential part of our economic machinery and that our troubles cannot be blamed upon this important factor in our methods of distribution.

Julius H. Barnes, Chairman of the Board of the National Chamber of Commerce, bids us beware of panaceas such as departures from our present competitive system, so-called "planned production," and state unemployment insurance. The National Chamber of Commerce did not, however, make definite recommendations about the stabilization of industry or the elimination of business cycles. The Missouri Bankers' Association advocated wage reductions unless price levels turned upward. This recommendation was met with a storm of disapproval both by labor organizations and by such representatives of business as James A. Farrell, president of the United States Steel Corporation.

Mr. Farrell pointed out also that it is essential for our prosperity as a nation that we find markets overseas for at least 10 per cent of the total production of our farms and industries. During the last two years our exports have not only fallen off, but have been faced with even sterner competition than before. The Prince of Wales, who is probably the world's best known "contact man," has advised England to get back the trade of South America which she has lost to us, by using American methods of advertising, high pressure selling and economical production.

Perhaps we can find a summary of the best of these varied instructions from so many experts in a group of negative "commandments" from Dr. Julius Klein, Assistant Secretary of Commerce, which runs as follows:

1. Don't blame the depression for everything which has marred the economic scene since 1929.
2. Don't compare peaks with slumps. Both are abnormalities.
3. Don't fall into the fallacy so common among European industrialists of expecting the wage earner to bear the brunt of readjustment.
4. Don't cut loose from association activities in business. Collaborate in chambers of commerce and trade associations.
5. Don't ignore the amazing power of the new technology.
6. Don't cut marketing research.
7. Don't overlook the stabilizing value of foreign markets.
8. Don't fall again into the perils of mass mania. Quantity operations, whether in output or distribution, are by no means invariable assurances of quantity profits.
9. Don't overlook the perils of obsolete equipment.
10. Don't be stampeded by unfounded rumors.

Plating Is Fundamental

No art or industry can exist indefinitely without a sound economic basis. Some have questioned the fundamental stability of an industry like electroplating on the ground that it is merely a surface coating—only skin deep. This is hardly a valid objection.

The trend at the present time and so far as we can see, for some years to come, is in the direction of production at lower costs, greater utility and more attractive appearance.

The lower costs and greater utility are often interrelated and have been brought home to us by the steadily declining price structure of raw materials culminating in the present world-wide depression. Attractive appearance we learned to demand during our period of pros-

perity when we could afford to buy articles for beauty as well as utility. Since it is just as hard to unlearn habits as it is to acquire them, we now demand beauty of finish as well as the necessary wearing qualities, at a low price.

Into this structure, electroplating fits admirably. If an article is made of castings of a cheap base, any finish can be later super-imposed making it just as pleasing to the eye as if the base were of precious metals. If expediency in manufacture or cost dictates the use of cheap metals, the cheapest available or adequate material can be used and then covered inexpensively with any kind of a plated and finished surface. The life of the finish depends almost entirely upon the amount of metal deposited and the care with which the work is done. The important item of cost is, of course, the quality of the work, as the quantities of metal used per piece are actually trifling.

To the argument that solid metals are sure to outlast plated metals, it is only necessary to answer that solid metals with adequate resistance to corrosion and tarnish are still very expensive and show no signs of being able to stand much reduction in the future. Articles of solid chromium would be unthinkable; products made of solid tungsten would be equally impossible. On the other hand, articles properly plated with chromium have almost all the advantages of anything made of that metal alone and are free from its disadvantages. Tungsten which has just come into the electroplating field, is likely to be much more widely useful as a plated metal than as a solid material.

The answer is plain. Electroplating is founded on the bed-rock of practical, economic and utilitarian value, and the fundamental human desire for beauty. The industry like all others will have its fluctuations, but there need be no fear of elimination as long as it keeps abreast of the times and upholds its very high standards of workmanship.

The Need for Better Zinc Coatings

Hot zinc coated (galvanized) products are faced with a condition similar to that which has confronted electroplaters for some time. The consuming public, knowing little or nothing about manufacturing methods, has no opinion about the quality of galvanized articles. They know that such articles should resist rust and they are always unpleasantly surprised when rust actually appears. The much better informed purchasers of galvanized materials, such as railway and highway departments, specify heavy zinc coatings, knowing full well that upon the weight of these coatings depends the length of service of the parts which they buy.

A survey of the farm market (one of the largest outlets for galvanized products) made by the American Zinc Institute, gave much illuminating information. In specimens of galvanized sheets, taken from farm roofs where they had been in actual service, a great variation was noticed, the life of these sheets varying from a few years up to 35 years' exposure to the weather. In every case superior service and long life were found to be related to a heavy zinc coating, about 1.6 ounces or more per square foot.

It is recommended by J. B. Conover, secretary of the Zinc Institute that, first, a superior zinced sheet be made available to the general consumer, this sheet to be stamped with the weight of the zinc coating and thus readily identifiable as a quality product; second, that the consumer and dealer be educated to the well-coated sheet. The combined efforts of the producer, jobber and retailer to bring the facts home to the consumer should react to the advantage of all concerned. It would place zinc coated products in the position which they deserve, specifying quality for quality jobs and permitting lower grades for those outlets which do not need the highest type of materials. It would also eliminate the confusion of the wide variations in prices caused by the competition of inferior with superior products without distinct classifications.

Silver Continues to Decline

In company with most other raw materials, the price of silver continues to slip, the most recent quotations at the time of writing being about 26c per ounce. This condition has been the occasion of concern not only in industry but in financial and governmental circles as well.

It has gone so far as to become a subject of a discussion, short but pointed, between ex-president Coolidge and Senator Borah. Mr. Coolidge in one of his daily press messages stated that silver has been cheapened by the increased use of machinery and invention in its production. Senator Borah points out that over-production has been, if anything, a minor cause of the drop in price, the important factor having been the demonetization in India, the reduction by England of its silver coinage from 9/10 to 5/10 silver and the issuance by France and Austria of paper, brass, nickel and copper to replace its silver coinage.

Probably most of those engaged in the silver industry will agree that demonetization has been the greatest individual cause of the decline as it has resulted in the release of huge supplies of the metal for industrial purposes which, if they were not actually dumped on the market constituted a threat of impending sales.

To be sure production has decreased due to this condition but adequate reduction has been impossible because silver is produced to such a great extent as a by-product with other metals. It still remains the problem of the silver industry to devise new uses, and to expand through popularization, the old avenues of consumption.

Specifications for Materials

One of the important features of the coming meeting of the American Society for Testing Materials in Chicago, June 22-26, will be a joint session of that Society with the Western Society of Engineers on The Economic Significance of Specifications for Materials. In this session, five leading business executives will give their impressions of the advantages of specifications for the purchasers.

Specifications have a significance far beyond that of a technical document. They influence vitally the economic relations that underlie the buying and selling of commodities. They assure the buyer of honest value just as they assure the seller of fair competition.

The Society for Testing Materials, while a strictly technical society, through its standard specifications is really performing a great economic service for industry. This service is measurably increased by getting together producers and consumers in discussions clarifying questions which may be cloudy and eliminating as far as possible, differences of opinion. Such conferences will go far toward the improvement of business practices and the stabilization of business conditions.

Correspondence and Discussion

Prize Award

To the Editor of THE METAL INDUSTRY:

I am in receipt of, and thank you for, your check for $50.00, being the prize awarded my article "Casting Railway Bronzes in Permanent Molds," published in your issue for May, 1930.

On this occasion I am desirous to express to you and through you to Messrs. G. H. Clamer, H. M. St. John and W. J. Reardon, the judges who passed on the merits of my article, my pleasure and appreciation for this mark of distinction.

Lenoir City, Tenn., HENRI MARIUS,
May, 1931. Technical Advisor, Lenoir Car Works.

Aluminum Pressure Castings

To the Editor of THE METAL INDUSTRY:

In your February, 1931, issue, page 82, there is a problem, "Aluminum Pressure Castings," how to overcome leakage in such castings which have a wall thickness of 13/64", etc. In your answer you recommend a mixture of 12% copper, 1% silicon and balance aluminum, advising that the aluminum must be 99.99% pure. You also recommend chloride of zinc as a flux.

Without going into great detail about the suggested use of hardeners and fluxing, we would like to bring to your attention the fact that we are makers of large quantities of die castings which are subjected to water pressure. Many of these are tested in our plant by water pressure of about 100 lbs. per sq. in. For this purpose we are using an aluminum base alloy containing approximately 1½% copper, ¾% silicon, 2¼% nickel, but other mixtures are also usable for jobs of this kind.

In regard to your mixture, we are somewhat skeptical of the corrosive resistance of this alloy. Certainly, the necessity of 99.99% pure aluminum is out of the question which, as I know, is used only for laboratory purposes up to the present time. A good grade of 98-99% aluminum will do the job perfectly and make a suitable alloy.

As we believe it may harm the die casting industry when answers are given in the way you have done, we certainly would be willing to offer our assistance whenever a question of this kind arises or we would suggest that you get in touch with one of the consulting engineers working in this line, for example, Mr. Sam Tour of Lucius Pitkin, Inc., and others.

I hope you will take this letter only as a constructive criticism.

THE NEWTON DIE CASTING CORPORATION,
Fred J. Tobias, Research Department.
New Haven, Conn., February, 1931.

We believe you are talking about die casting. Our answer was for sand castings and we have had considerable experience with aluminum alloy castings made to withstand water pressure. We have found the mixture given to be the best of all the mixtures tried. However, we might stretch the purity of the aluminum; 99-plus would answer, and this is what we use most.

What we wanted to emphasize was not to use remelt aluminum, but virgin aluminum. We are aware that when aluminum is die cast, mixtures with less copper have proved successful, such as given: 1½% copper; ¾% silicon; 2¼% nickel; balance aluminum. But for sand castings this alloy would not be suitable; and we advise virgin aluminum be used, as pure as possible, 99-plus.

However, we are pleased to receive your comments.

W. J. REARDON, Associate Editor.

New Books

Platers' Guidebook 1931 Edition. By Oliver J. Sizelove. Published by THE METAL INDUSTRY. Size 5 x 8. Free to subscribers of THE METAL INDUSTRY and BRASS WORLD.

Our readers are, of course, familiar with the first edition of Platers' Guidebook of which 15,000 copies were distributed in 1930. The 1931 edition is made up of entirely new material covering a variety of subjects in great detail, which were not included in the first edition. The scope of the new booklet can be seen from the following list of topics:

Electroplating Non-metallics, Silvering Mirrors, Cleaning, Etching, Barrel Burnishing, Polishing Before and After Plating, Plating Zinc Die Castings, Lacquering and Enameling, pH determination.

The booklet is printed and bound in simple but compact form, easily carried about in the pocket and available for reference at any moment. It is a worthy successor to the 1930 Guidebook which attained such quick and widespread popularity in the finishing industries.

Technical Papers

British Standard Specifications. British Engineering Standards Association, Publications Department, 28 Victoria Street, London, S. W. 1, England. 2s 2d each. No. 407, Phosphor Bronze Sheets and Strip, high tin and low tin alloys, excluding drawn material; No. 409, Naval Brass Plates, hot and cold rolled.

Spectrum Analysis in Mineralogy, by A. A. Fitch. Adam Hilger, Ltd., 24 Rochester Place, Camden Road, London, N. W. 1, England. 52 pages, paperbound, illustrated; 1s 11d., postpaid.

Standard Thicknesses, Weights, and Tolerances of Sheet Metal (Customary Practice). Circular No. 391, Bureau of Standards, Department of Commerce, Washington, D. C. 32 pages, paperbound; obtainable from Superintendent of Documents for 10 cents.

Research Service for Industry. Department of Engineering Research, Univesity of Michigan, Ann Arbor, Mich. Engineering Research Circular No. 5, 40 pages, paperbound, illustrated.

An investigation of Core Oils, by Carl H. Casberg and Carl E. Schubert. Bulletin No. 221, Engineering Experiment Station, University of Illinois, Urbana, Ill. 22 pages, paperbound; 15 cents.

Abstracts of Scientific and Technical Publications from the Massachusetts Institute of Technology, Cambridge, Mass. Covers July-December, 1930.

Government Publications

Government publications are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., to whom proper remittance should be made to cover price where a charge is mentioned. In some cases, as indicated, applications should be made to the governmental body responsible for the publication.

Statistics of Refined Primary Lead in the United States in 1930. Department of Commerce, Washington, D. C.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

Metallurgical Foundry, Rolling Mill, Mechanical

H. M. ST. JOHN — W. J. PETTIS
W. J. REARDON — P. W. BLAIR

Electroplating, Polishing, and Metal Finishing

O. J. SIZELOVE — A. K. GRAHAM, Ph.D.
G. B. HOGABOOM — WALTER FRAINE

Babbitting Bearings

Q.—I would like to have such information as you can furnish regarding the tinning of cast iron, either finished or over the scale, preparatory to babbitting. Also such information as you have at hand concerning the centrifugal casting of babbitt in large shells, say from 6″ to 12″ in diameter.

A.—It is of utmost importance for good results with every bearing metal, no matter what it consists of, to make the closest possible connection between bearing and metal backing. The surface of the bearing which is to come in contact with metal must be thoroughly and brightly cleaned. It is then heated over a charcoal fire after swabbing with a solution of muriatic acid saturated with zinc, and dipped in a mixture of one part tin and one part lead.

After this the bearing is gently heated again over the charcoal fire when it is ready to receive the babbitt bearing.

The iron casting should be sand blasted to remove all rust and scale, or should be pickled in hot hydrofluoric acid solution: water 1 gallon, hydrofluoric acid 24 ounces; temperature 160 degrees Fahrenheit.

When the burnt-in sand and surface scale are dissolved, wash in cold water and dip in boiling water. The castings are then ready to be tinned before pouring the babbitt.

With reference to the centrifugal casting of babbitt, we would refer you to an article in THE METAL INDUSTRY of August, 1927, page 326. This gives a description of a centrifugal machine.

Very often bearings of cast iron, malleable iron or steel need not be tinned, but to hold the metal fast the bearing must be provided with dovetailed notches or ring facets on the end of the bearing. On slide bearings, if the edges are exposed to strain, they must be secured by screw-head shaped projections. Form the bed in such a way that the metal is secured against expanding lengthwise by the cast iron outer edge. To guard against spraining over the length of axle, provide the bed with nose pieces.

W. J. R., Problem 4,097.

Casting Bronze

Q.—Enclosed find defective parts of bronze bushing and part made out of 88-10-2 metal. As you will see, the broken part shows dark spots in the metal. What causes this defect and how can it be remedied?

A.—On examination of defective cast bushing made of 88-10-2 metal, we find the metal very spongy and oxidized, and all we can tell you is that this defect is in the metal. Either the metal has been misused in the melting in your foundry practice, or the metal used was badly oxidized when you received it.

We suggest, first, that you check over your melting practice and if you are using ingot metal in the crucible furnace to charge your ingot in the crucible with 2 ounces of 15 per cent phosphor-copper to each 100 pounds of metal charged—1 ounce when you charge the metal and the other ounce when the metal is ready to take out of the furnace to pour. A spoonful of salt should be also added just before the metal is taken out. Pour at approximately 2,000 to 2,100 degrees Fahrenheit. See that the metal is not left in the furnace after it has been brought up to pouring temperature. Pour as soon as possible after pouring temperature has been reached. Melt quickly.

If you use open flame furnace, use at least 18 ounces of air and 25 to 40 pounds oil pressure. Keep your furnace clean. If you use new metal, melt the copper with 1 ounce of 15 per cent phosphor copper to the hundred. Add the tin, stir well, and then add zinc, then 1 ounce of 15 per cent phosphor copper to the hundred.

If you follow these instructions you should overcome your difficulty. At any rate, the trouble is metal trouble and may be in the purchased material. Check this up in case your practice checks up with instructions given.

W. J. R., Problem 4,098.

Copper Analysis

Q.—I am sending you a sample of my copper solution for analysis. I made this 1½ years ago, from a standard copper carbonate formula. The past two months it has not given satisfaction. The plate peels off and black streaks also appear. There is a kind of smut on some of the work. About four months ago we added 50 gallons of solution to replace some that had leaked out. We made up the addition as follows: sodium cyanide 3½ oz.; copper cyanide 3 oz.; soda ash 1 oz.; water 1 gallon.

A.—Analysis of cyanide copper solution:

Metallic copper	1.90 oz.
Free cyanide	0.07 oz.

The metal and free cyanide contents are both too low. We would suggest that you add to each gallon of solution 1 ounce of copper cyanide, and 2 ounces of sodium cyanide. Then operate the solution at a temperature of 100° F. For a brightener, add 1 ounce of hyposulphite of soda to each 100 gallons of solution.

O. J. S., Problem 4,099.

Lithographing on Aluminum

Q.—As manufacturers of etched and lithographed dials and name plates, we have been frequently called upon to supply a lithographed "sun-ray" or "sun-burst" finish on aluminum dials used on clocks.

We have never been quite successful in obtaining completely satisfactory results. Can you assist us by furnishing information as to how this finish is produced on aluminum?

A.—The printing plate may be made as usual by making the design and negative. Then transfer to zinc plate; tool or etch out; mount plate; lock plate on press.

Success in printing on aluminum is dependent on the kind of ink used. For this purpose we suggest that you consult one of the best manufacturers of printing inks, any one of whom will be pleased to work with you to get the desired result.

For broad lines or solid effects the printing table can be made on linoleum or rubber composition instead of zinc, in which case the designer engraves the design in the material. For information on rubber plates see back issues of the "Inland Printer."

W. F., Problem 5,000.

Filling Knife Handles

Q.—From time to time we have a lot of trouble in our silver repairing department with hollow handled knives. Usually we fill the handles with melted resin and let this set. However, some of our customers must use very hot cleaning water and we occasionally get back a lot of knives with the resin melted out all over the handles.

Can you tell us the usual practice in handling work of this sort?

A.—We would suggest that you use a cement made of litharge and glycerine to fill the hollow handles of the knives. If this makes the handles too heavy, fill them partly with resin and use the litharge cement for the other part.

In preparing the cement place the litharge in an enameled container and then add the glycerine, stirring until the cement is of the proper consistency. O. J. S., Problem 5,001.

Nickel and Copper Plating

Q.—Please let me have formulas for nickel and copper solutions which will plate on all kinds of automobile work. Copper should take on lead as well as iron.

I am trying to cast lead in slush molds for novelties. At what temperature is old lead pipe melted and poured for such work? I use brass molds and the figures do not seem to cast properly.

A.—Formula for nickel solution:

Double nickel salts	8 oz.
Single nickel salts	4 oz.
Boric acid	2 oz.
Sodium chloride	2 oz.

pH should be kept at 5.8.

Formula for cyanide copper solution:

Cyanide of copper	3½ oz.
Sodium cyanide	4½ oz.
Carbonate soda	2 oz.
Hyposulphite soda	1/64 oz.
Water	1 gal.

Operate solution at 100° F.; 1 to 2 volts.

The copper solution can be used for both lead and steel work. Lead alone is not used for casting made by the slush mold method. An alloy of lead and antimony is used: 84 per cent of lead and 16 per cent of antimony will produce a uniform casting that is not too hard. The pouring temperature should be about 450° F., and proper handling of the mold is necessary to produce good castings.

O. J. S., Problem 5,002.

Solutions Analyzed

Q.—I am sending you samples of my chromium, brass and copper solutions for analysis.

Can you tell me what advantage there is in reversing lead anodes to the cathode terminals in a chromium bath, and using the lead tank lining as the anode?

The brass solution deposits very poorly on cast iron. The depressions seem to plate dark gray; the same with corners.

The copper solution produces streaky deposits, especially when the iron or steel contains sand holes or rust spots. Streaks appeared on 8-inch cold rolled steel discs which I plated fairly heavily.

A.—Analysis of copper solution:

Metallic copper	6.41 oz.
Free cyanide	3.19 oz.

Analysis shows the solution to be too concentrated. We would suggest that you take half of the solution from the tank and then replenish with water. Add 1 ounce of hyposulphite soda to each 100 gallons of solution to clear the deposit.

Analysis of brass solution:

Metallic copper	5.01 oz.
Metallic zinc	1.10 oz.
Free cyanide	6.05 oz.

The metals and free cyanide are in the proper ratio to produce a good yellow brass deposit, but the concentration of the solution is too high. Take ⅓ of the solution from the tank, then replenish with water and operate the solution at 80° F., with a cathode current density of 3 to 4 amperes per square foot.

Analysis of chromium solution:

Chromic acid	55.90 oz.
Trivalent chromium	0.37 oz.
Sulphates	0.72 oz.

The sulphate content is higher than it should be for best operating conditions. Do not add any more sulphates until they are reduced to less than 0.50 ounce per gallon.

The lead tank should be lined with glass to prevent it from being in circuit, for best results.

O. J. S., Problem 5,003.

Replating Instruments

Q.—Please give me directions for replating with nickel a lot of old surgical instruments which are badly pitted. Can I ball burnish them? I wish to chromium plate them, finally.

A.—If the surgical instruments are badly corroded, they should be pickled in a hot muriatic acid to remove the rust, and the old nickel removed in a sulfuric acid strip. This strip is made by diluting sulfuric acid with water to a Beaumé reading of 45°. Lead cathodes are used, with reverse current.

After the nickel has been removed, the work should be repolished. Ball burnishing will not produce a very good finish on this class of work. After polishing and cleaning, plate in a nickel solution made from the following formula:

Double nickel salts	8 oz.
Single nickel salts	4 oz.
Boric acid	2 oz.
Sodium chloride	2 oz.
Water	1 gallon

Operate solution at a temperature of 100° F., and maintain a pH of 5.8. Use 2 to 2½ volts. After plating for 1½ to 2 hours in the nickel solution, nickel color and then chromium plate.

O. J. S., Problem 5,004.

Silver Plate

Q.—Can you tell me just how much amperage is required to silver plate a dozen of the regular size steel dinner knives? Also, how long should they be kept in the silver solution to give them the average silver plate?

A.—Silver solutions that are in good operating condition and used without agitation of the cathode are operated with about 4 amperes per square foot of cathode (work) surface. A dozen knives of the ordinary kind have a surface of approximately 1½ square feet, so about 6 amperes would be sufficient.

A deposit of .001 of an inch of silver would be considered a fair deposit, and to produce this with 4 amperes per square foot would take approximately 1½ hours.

O. J. S., Problem 5,005.

Transfer Paper for Etching

Q.—Can you give me some information in details of the process of making etching paper for transferring and how to apply it on sheet brass? I intend to etch brass parts using one part sulphuric acid and nine parts water.

A.—Transfer papers to be used as designs for etching may be made of a good quality of tough heavy paper. Both sides of the paper should be coated with at least two coats of shellac in alcohol. The pattern or lettering is stenciled on and cut through the paper to expose the metal. The underside of the paper should be given a fresh coat of shellac and pressed to the metal while still wet.

A better method of procedure where only a few pieces of the same design is required is to coat the metal with hot beeswax or ozokerite, covering this with lead foil, and then to cut the design or pattern through the foil where the etching is to be made and lifting the foil from these portions, brush wax off exposed portions with benzine and etch either by immersion or electrically as desired. After etching, the foil can be quickly removed in hot water.

W. F., Problem 5,006.

Patents

A Review of Current Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,794,863. March 3, 1931. **Electric-Furnace Method.** Edwin Fitch Northrup, Princeton, N. J., assignor to Ajax Electrothermic Corporation, Ajax Park, N. J.

The method of melting a charge of finely divided dry material which consists in mingling energy absorbing lumps of electrically conducting material within the charge to be heated, the lumps being large enough to be separately heated by induction in passing an alternating electric current about the charge and lumps to heat the charge by heating the lumps and continuing the heating operation until the finely divided material is melted.

1,795,459. March 10, 1931. **Chromium Plating.** Leon R. Westbrook, Cleveland Heights, Ohio, assignor, by mesne assignments, to The Grasselli Chemical Company, Cleveland, Ohio.

A chromium plating bath consisting of an aqueous solution of chromic acid containing a small amount of SO_4- - radical and a small amount of the negative radical corresponding to one of the acids of the group comprising molybdic and vanadic acid.

1,795,473. March 10, 1931. **Method of Treating Magnesium.** Edward C. Burdick, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich.

A method of treating magnesium articles which comprises subjecting the article to the action of ten to thirty per cent sulphuric acid, and then washing.

1,795,481. March 10, 1931. **Process of Electrodepositing Chromium.** William S. Eaton, Sag Harbor, N. Y.

The herein described process of electrodepositing chromium, consisting in cleaning the surface of the article upon which the chromium is to be deposited, immersing the article is an electrolytic bath, the active ingredients of which consist solely of chromic acid and sodium carbonate in solution in water, and in operative relation to an anode, and passing an electric current through a circuit containing therein the anode, the electrolyte and the article as the cathode.

1,795,633. March 10, 1931. **Lead-Bearing Alloy Containing Copper and Nickel.** Emil Abel, Vienna, Austria, assignor to Jacob Neurath, Vienna, Austria.

A process for compounding a bearing alloy of lead, antimony, tin and nickel in which the nickel is present in the α form which comprises restricting the nickel content to less than about 1 per cent and adding thereto, copper in an amount at least about 1.5 times the nickel content.

1,797,124. March 17, 1931. **Soldering Flux.** Dana W. Bowers, Lansdale, Pa., assignor of forty-nine one-hundredths to Charles T. Asbury, Philadelphia, Pa.

A soldering flux comprising beeswax 8 parts, oleic acid 32 parts, and silver oxide 2 parts.

A soldering flux comprising beeswax 6 parts to 10 parts, oleic acid 25 parts to 40 parts, silver oxide 1 part to 3 parts, and finely granulated solder, the solder being present in a proportion about equal to the other ingredients.

1,797,125. March 17, 1931. **Method of Smelting Metal.** Carl Brackelsberg, Milspe, Germany.

The method of operating rotatable drum furnaces for the melting of metals by the use of powdered coal as fuel, which consists in burning the fuel directly in the furnace melting chamber by the aid of combustion air of such volume and pressure as to cause the fuel to be burned in suspension and the ashes of combustion to be blown through the outlet of the furnace.

1,797,236. **Alloy.** March 24, 1931. Harry Klausmann, Maplewood, and Henry R. Kiepe, Newark, N. J., assignors to Baker & Company, Inc., a Corporation of New Jersey.

An alloy comprising palladium, rhodium and ruthenium in substantially the proportion of seventy-five per cent (75%) to ninety-eight per cent (98%) of palladium, twenty-four per cent (24%) to one per cent (1%) of rhodium and the rest ruthenium.

1,797,254. March 24, 1931. **Process of Plating.** William J. Wrighton and Edgar D. Tillyer, Southbridge, Mass., assignors to American Optical Company, Southbridge, Mass., a Voluntary Association of Massachusetts.

The process of producing an article of manufacture from nickel whose properties are desired, but which has a low elastic limit causing it to partially fracture and pit under ordinary shaping conditions, comprising shaping the nickel to the shape of the required article by stretching it beyond its elastic limit and thereafter filling the surface fractures and pits with nickel which has not been worked beyond its elastic limit.

1,797,276. March 24, 1931. **Metal-Recovering Furnace.** Theron D. Stay and Harrison O. Burrows, Cleveland, Ohio, assignors to Aluminum Company of America, Pittsburgh, Pa.

In an apparatus for reclaiming scrap-metal, a furnace of substantially rectangular cross section having inlets at one side thereof for the heating medium, downwardly directed jets set in the inlets arranged to direct the medium in a substantially diagonal direction across the furance into contact with the surface of the metal, and outlets at the same side as and lower than the inlets for escape of exhaust gases.

1,797,357. March 24, 1931. **Chromium Plating.** John F. K. McCullough and Benjamin W. Gilchrist, Detroit, Mich., assignors to Ternstedt Manufacturing Company, Detroit, Mich.

A chromium plating bath including when ready for operation, chlorochromate of soda, chromium chromate, hydrochloric acid, and water.

1,797,851. March 24, 1931. **Aluminum Base Alloy.** Theodore W. Bossert, New Kensington, and Joseph A. Nock, Jr., Tarentum, Pa., assignors to Aluminum Company of America, Pittsburgh, Pa.

An aluminum base alloy containing from about 1 to about 1.5 per cent of manganese, and from about 0.5 to about 1.5 per cent of magnesium, the aluminum content being not less than about 95 per cent, and alloy being free from other alloying constituents except those present as impurities.

1,798,218. March 31, 1931. **Coating and Coloring Metals.** Aladar Pacz, Cleveland, Ohio.

The process of coating articles consisting at least superficially of iron, steel, tin, aluminum, zinc, cadmium, lead, or magnesium which contains the step of simple immersion in a solution containing a soluble molybdate and a soluble oxalate.

1,798,391. March 31, 1931. **Process of an Apparatus for Electroplating Hollow Parts.** Ernst Würth, Goppingen, Germany.

The method of electroplating hollow longitudinally slotted shapes comprising immersing such shape in an electrolytic cell comprising an anode, connecting said part as the cathode, and securing in the slot of the shape, but out of electrical contact with same a piece of the metal to be deposited in such manner that such piece partly projects into the hollow of said shape and partly into said cell outside of said shape.

1,798,994. March 31, 1931. **Electroplating Apparatus.** John J. Whalin, Baltimore, Md., assignor to General Electric Company, a Corporation of New York.

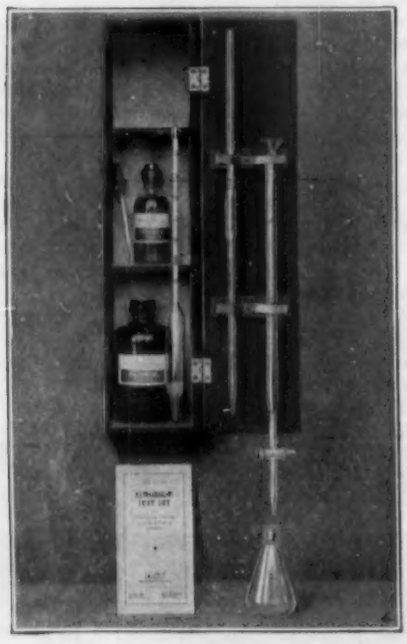
In electroplating apparatus, a tank for the electrolyte, a perforated container mounted therein adapted to contain articles to be plated, a gear secured to said container, a stationary rack engaging said gear, supporting means for said container, said means being mounted on said rack, and means for moving said supporting means to thereby rotate the plating barrel.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

Solution Testing Apparatus

Kocour Company, Inc., 4724 South Turner Avenue, Chicago, Ill., manufactures a variety of laboratory apparatus for testing electroplating solutions, cleaners, etc., including the well known "Kocour" Model B analytical set for determining chloride in nickel solutions, a set for determining pH (hydrogen ion concentration, or acidity) of nickel baths, and others. The company has announced that the tubes supplied with its sets do not fade out over any length of time.



"Kocour" Model AC Test Set for Acid Copper Solutions

In announcing the Model B chloride test set, the company states that it is an improvement in this type of apparatus in that the standardized solution is of more suitable normality. A larger quantity of it is now supplied with sets, and the price of the complete outfit has been reduced.

Another of this maker's products is the "Kocour" Model AC analytical set for determining sulphuric acid and copper sulphate in acid copper electroplating and electrotyping solutions. This set is shown in the illustration.

Tripoli for Polishing Composition

Barnsdall Tripoli Company, Seneca, Mo., subsidiary of Barnsdall Corporation, has issued an interesting booklet, "Barnsdall Tripoli," in which is described the history, occurrence, preparation and uses of tripoli, chief use of which is in the manufacture of polishing composition. The company states that in 1868 tripoli was discovered on what is now its land. It was first applied commercially in the manufacture of the "American Bath Brick," a polishing device, by the Monarch Tripoli Company. The first tripoli grinding mill was built in 1885, and three years later the American Tripoli Company was organized. This concern was incorporated in 1892, and in 1919 it was acquired by the Barnsdall Corporation. The name was changed to Barnsdall Tripoli Company this year. The booklet gives a great deal of very interesting information, both historical and technical, about tripoli. It is very well illustrated. Readers may obtain copies by addressing the company directly.

Brass Die-Castings

A process for die-casting of copper-base alloy is announced by the Doehler Die Casting Company, executive offices 386 Fourth Avenue, New York. This company was pioneer in die-casting of lead, tin and zinc alloy die-castings and claims to have been the first to introduce aluminum die-castings. The name "Doehler Brass Die Castings" has been adopted to distinguish the products of the new process, by means of which brass of various compositions will be die-cast by forcing a molten copper-base alloy under pressure into metallic dies. Such castings, it is pointed out, are not to be confused with brass or bronze castings poured by gravity into molds or dies.

The company states that the advantages of copper-base alloys over various other metals are well known, and that their availability in the form of die-castings presents industry with increased opportunity for making use of the qualities of the copper-base alloys. It is stated that many intricate brass parts heretofore presenting difficult or costly production problems, and parts formerly made in two parts and soldered together, can now be produced by the Doehler die-casting process at greatly reduced expense. It is stated that the brass die-castings show the same uniform accuracy, smoothness and fine detail characteristic of Doehler zinc and aluminum base die-castings. It is claimed that brass cast by the new Doehler process shows fine grain structure and very few imperfections. Soap dispenser valves and tilt type soap dispenser bands produced as brass die-castings for an important company marketing dispensers and disinfectants are stated to take a fine chromium plate which matches modern washroom fixtures. The brass die-castings for these parts are said to require minimum preparation for plating and to effect decided economies over sand castings and forgings formerly used.

Another feature of brass die-casting is the fact that inserts of other materials required to meet specific or unusual applications can be cast in just as in the die-castings of other alloys.

The alloy which has been adopted for die-casting, known as "Doehler No. 2," is said to meet the requirements of S. A. E. specification No. 43, and A. S. T. M. specification B-54-27, for cast brass, with the essential constituents of copper, zinc, tin and aluminum. The company gives the following physical characteristics of the alloy when die-cast:

Tensile strength (ultimate)	65,000—70,000 lbs. sq. in.
Yield point	35,000—45,000 lbs. sq. in.
Elastic limit	20,000—30,000 lbs. sq. in.
Elongation	15—20% in 2 inches
Reduction area	10—20%
Brinell hardness (500 kg)	130—140
Weight per cu. in.	0.303 lb.
Impact strength (Izod)	20—40 ft. lbs.

New Nickel Brightener

A new brightener used as an addition agent in nickel plating baths is offered by The Lea Manufacturing Company, Waterbury, Conn. This product is manufactured under the name of "Nickel-Glo." It is used in quantities of 3 to 4 ounces per 100 gallons in barrel plating and 2 to 3 ounces per 100 gallons in still plating. According to the manufacturer, an exceedingly bright plate is obtained, and since it contains no materials of a colloidal nature is harmless to the solution. Every ingredient plates out on the work, it is stated. Color buffing and burnishing are eliminated on many types of work and costs are said to be materially reduced not only on labor and time but due to the small quantities of "Nickel-Glo" used.

Potentiometer Pyrometer

The Brown Instrument Company, Philadelphia, Pa., is placing on the market a new null type potentiometer pyrometer, which will indicate, record and automatically control temperature with extreme precision, according to the maker. The prime object in the development of this instrument was to produce an extremely accurate pyrometer to meet the requirements in modern industrial practice and sufficiently rugged to withstand the severe service conditions met with in industry.

The new Brown potentiometer pyrometer is said to incorporate some 53 features new to potentiometer pyrometers, including a positive driving mechanism controlled by the galvanometer and exerting minimum force on the galvanometer pointer and a long 40" slide wire enclosed in glass and which can be immersed in oil where decided for protection from corrosive gases and vapors; automatic compensator which corrects the pen position for expansion and contraction of the chart paper with change in humidity of the atmosphere. The oblong holes in a strip chart are necessary to permit of this expansion and contraction with change in humidity, and this movement of the chart can cause an error of as much as 1% of full scale value if not corrected for, they state.

Automatic temperature control is obtained through mercury switches which can handle up to 25 amperes directly, without the use of relays. The case has been so designed that the instrument can be mounted on a wall, on a table, or either front-of-board or flush mounted on a panel board.

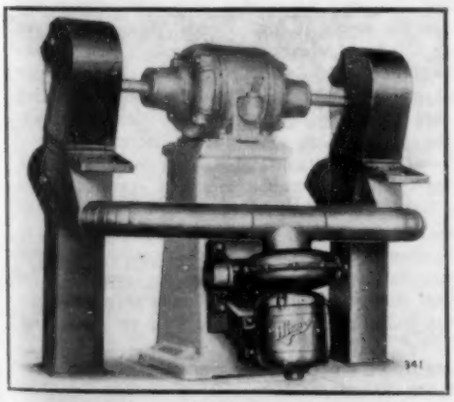
Aluminum Alloy

Apex Smelting Company, Chicago, Ill., has announced the development, after some years of research, of a new aluminum alloy known as "Perm-a-Brite," said to be radically different from other commonly used aluminum alloys. The company gives a number of the metal's characteristics, including lower specific gravity than pure aluminum, alloys of the silicon group, and about 10% lighter than No. 12 alloy. Weight is 163 pounds per cubic foot. Sand cast specimens are said to show high strength and extreme ductility, elongation being 6% to 8% in 2 inches in sand castings, and up to 23% in rolled forms.

Other advantages of the new alloy are said to be high corrosion resistance, fine surface lending itself to polishing and plating; good sand and die casting qualities; good rolling, forging, drawing, hot and cold working properties. Investigation is being made as to extrusion. The company offers complete information regarding use of the new alloy. Bulletin No. 1 has been issued covering the alloy, on which patents are now pending, it is stated.

Dust Exhausters

The illustration shows one type of the ball bearing motor driven exhauster equipment for buffing and polishing machines manufactured by The Hisey-Wolf Machine Company, Cincinnati, Ohio. This type of equipment is now available for use with Hisey machines previously supplied without it, and with new Hisey equipment. The manufacturer states that the same automatic motor starter simultaneously controls the motors of the polishing machine as well as the exhauster.



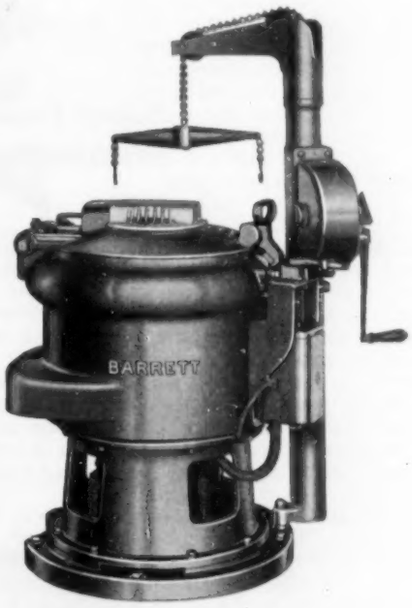
Hisey-Wolf Dust Exhaust System for Buffing and Polishing Machines

Complete information may be had by readers, who should address the company directly.

Centrifugal Washers and Dryers

A variety of equipment for washing and drying metal parts, and for extraction of oil from metal parts and machine tool chips, is manufactured by the Leon J. Barrett Company, Worcester, Mass.

The company states that its self-contained "Cyclone" dryers are designed to meet all requirements in rapid drying of parts washed before or after dipping, plating, acid treating, etc., where complete dryness is desired. The machines employ electric heating elements over which room-temperature air passes before being forced through contents of machine. All phases of the problem have been scientifically studied. The company makes washers which are also designed scientifically for highly efficient operation, it is stated. Complete engineering analysis of plant requirements is offered.



Barrett Centrifugal Dryer for Metal Parts

Gold Encasing Specialists Merge

The jewelry trade, especially those using gold-filled stock, will be interested in the announcement last month of the consolidation of the gold encasing patents and processes of E. G. Bek Company, Inc., and Weisberg and Greenwald, New York, the latter company having taken over management of the Bek concern. Licenses are to be issued in the name of E. G. Bek Company, Inc., but this company's customers will now be enabled to avail themselves of the experience in metal finishing, electroplating and related lines in which Weisberg and Greenwald are specialists. The office address will be 71 West 45th Street, New York City.

Both of the consolidated companies have worked for years on the development of gold encasing methods. The new arrangement brings to licensees the advantages of the experience and methods of both organizations, and removes limitations which have prevented full exploitation of each process separately, it is stated.

Gold encasing by improved methods is offered to jewelry manufacturers for making articles now produced from gold-filled stock, without the disadvantages of having exposed edges of base metal to corrode, large quantities of scrap, and expensive dies to carry the gold over edges, it is stated. By the encasing method the article is first made in base metal, then a gold plate of the desired karat is electrodeposited on the article, which is then processed to bond the plate to the base metal. In this way every edge and every surface is said to be covered with gold. Scrap, with its heavy losses, is eliminated, and inventories of gold can be greatly reduced, it is claimed.

Encasing can be done in all colors of gold—white, green, yellow or red, as well as with platinum and silver. The amount of precious metal on every piece can be controlled just as with rolled stock, the company states.

Post Guiding Revolutionizes Press Design

By FRED R. DANIELS

Waterbury-Farrel Foundry and Machine Company, Waterbury, Conn.

Salient Points of Design of the New Four-Post High Speed Blanking Press and the Advantages Accruing Therefrom

The outstanding characteristic of the Waterbury-Farrel four-post press is the method of guiding the gate or slide by a post or rod on each of its four corners. The posts are clamped securely in the gate, as shown in Fig. 1, and slide with it in bronze bearings in the frame—the gate does not slide on the posts.

These gate bearings, being located below as well as above the bottom of the gate, keep the tools in established alignment almost indefinitely and are therefore far superior to the long V-ways of conventional press design. The bearings are comparatively narrow, so that whatever wear does occur in them will result in only a very slight angular play; consequently the tools do not shear any appreciable amount after they have once been set up correctly. Furthermore, this precision in gate guiding can easily be maintained over an indefinitely long period. This is true because the split tapered bearings employed can be readily adjusted by means of two nuts to take up any infinitesimal wear that might develop after long usage.

The advantages of the construction are not theoretical; they are real and have been demonstrated repeatedly in practice. For example, in one of the largest motor factories in this country there has been in use for some time a special size machine of this type, 150-ton capacity, with feed table attached, which produced over 350,000 motor lamination stampings from strip steel 0.014″ thick and 14½″ wide, before the tools were reground. The scrap showed practically no burr at the end of this phenomenal run. The saving in tool upkeep, to say nothing of the increased production, can easily be appreciated.

The gate connections are arranged in pairs; they are of the solid type without threaded parts which require frequent adjustment due to wear. They are fitted to a bronze eccentric sleeve on the shaft, which is easily turned to adjust the tool height. To simplify this adjustment, the sleeve is graduated for direct reading. Each guide post carries a stiff coil spring at its upper end enclosed in a pipe casing. These lifter springs serve to take up all lost motion in the connection bearings.

Although the four-post press was not originally built for speed but rather to make possible the use of follow tools of unusual length requiring excellent guiding, its inherent advantages for high-speed operation were quite apparent. The smoothly running gate was a challenge to speed. But it was fully appreciated that any positive clutch like the sliding key clutch with which the press was equipped, if used in connection with an ordinary flywheel running at high speed, would be subjected to very severe usage when starting.

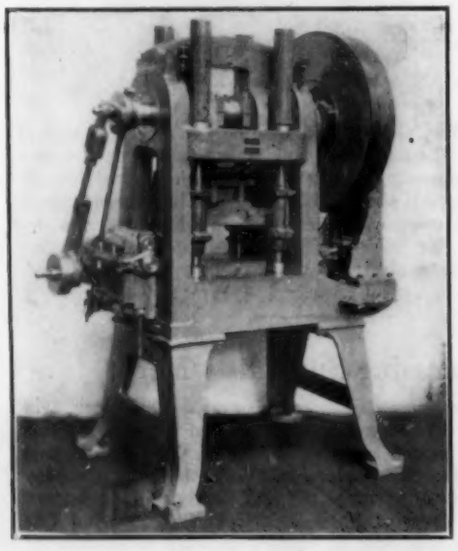


Fig. 1, Left—New Four-Post High Speed Blanking Press Manufactured by Waterbury-Farrel Foundry and Machine Company

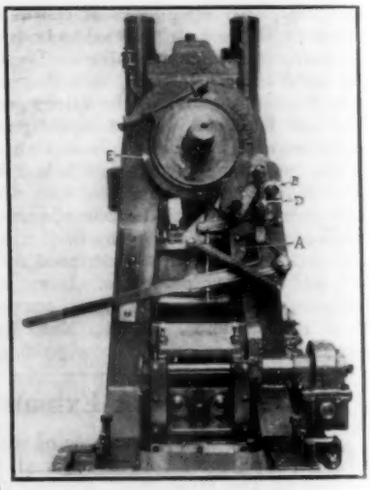


Fig. 2, Right—Side View of Four-Post Press, Showing Patented Clutch and Brake Mechanism, with Flywheel Removed to Show Construction

A special flywheel of assembled construction was accordingly developed and patented, and this wheel is a very vital unit in the successful operation of the press at high speed. The chief point of interest in this wheel is its flexible arms, which are so arranged that they absorb the shock of starting as well as relieve the inertia caused by suddenly slowing down from high rotative speeds. The arms are laminated springs which flex in either direction, according to the direction of strain on them.

The wheel is held on its hub between fiber discs by a large nut which is tightened to permit a certain amount of slippage when starting and yet be tight enough to overcome any tendency to vibrate when the tools hit the work. The wheel will also slip, if properly adjusted, in case unusual obstructions prevent the free movement of the gate, thus functioning as a safety device. The resiliency of the wheel and its proper adjustment serve also to lessen the shock on the roll feed, to prevent the rolls from slipping when starting.

The normal running speed of the 20-ton press is 300 revolutions per minute, of the 40-ton machine 250 revolutions, and of the 60-ton machine 200 revolutions. The special 150-ton press, referred to previously and shown in Fig. 3, was operated at 90 strokes per minute.

In connection with the shock-absorbing flywheel there is provided a special adaptation of sliding key clutch and automatic

safety friction brake. The clutch and brake mechanism is patented and capable of stopping the press from full speed in one revolution. The mechanism is shown in Fig. 2 in its running position with the hand-lever held down by a plate on the frame. The upper end of latch (A) hooks over clutch lever (B) holding it down until the hand-lever is released to stop the press.

Then the hand-lever springs up, the latch is tripped, and the key (C) is withdrawn from the flywheel by the clutch lever, which is specially formed on the end to "cam" into a notch in the key and force it back. But, at about the one-third point in its upward movement, the hand-lever causes arm (D) to swivel and straighten out like a toggle joint. Since one member (E) of the friction brake pivots on the end of this arm (D), some friction is applied to the shaft before the key is fully withdrawn; by the time the action is completed, and the hand-lever in its uppermost position, the flywheel is free and the full breaking pressure instantly applied, stopping the press very suddenly but without shock.

The double side roll feeds constitute one of the notable features of these machines. The feed units are adjustable vertically to agree with the die height and the left-hand unit can be swung out to lend greater access when setting up the tools. A single nut adjustment regulates the roll tension. The drive is from a graduated crank-plate on the left-hand end of the shaft. The stroke can be set to give any increment whatsoever, within the limits of each size press, by simply adjusting the radial position of the crank-plate stud to which the connection is fastened. There is a heavy coil spring in the connection, which serves as a buffer when starting; also a long rack and gear to permit long feeds, and a roll friction clutch supplanting the ancient toothed ratchet and pawl design which was incapable of minute adjustment. The right-hand unit is driven from the left-hand side through a back-shaft and enclosed helical gearing.

The roll feeds are provided with automatic releases which can be timed relative to the stroke of the press to operate near the end of the down traverse. This timing is of great importance, especially in the case of follow tools having pilot pins, because pilots differ in length for different tools. For convenience in setting up, a hand release is provided for the left-hand feed; also a crankhandle for mannually turning the feed rolls.

The metal is fed from left to right and is located on the face of the rolls by a metal guide attached to the left-hand feed unit. For thin or soft metals it is frequently required to use metal chutes to span the space between the dies and the rolls, through which the metal passes to and from the dies. These chutes are made as part of the tool equipment. They will overcome difficulties sometimes experienced in feeding metal which has a tendency to buckle or whip when fed at high speed. The scrap passes from the right-hand rolls through a suitable guide to the scrap shear. The shear blades operate from a cam, located just inside the outboard bearing on the flywheel end of the crankshaft.

Bearing Metal

A new bearing metal, claimed to be unusually efficient, and which can be produced at very attractive price, has been developed by Harrison D. Boyer, Room 2521, 15 Park Row, New York City. The announcement states the alloy is a distinctly new development. It is gray in color, casts, machines and polishes like brass, not subject to rust, and requires little lubrication when used as a bearing, it is stated. Tests for performance as to strength, hardness, resistance to crushing, etc., by the Pittsburgh Testing Laboratories and other laboratories are said to show very good results. Tensile strength is 43,000 pounds; yield point, 33,500; Brinell hardness, 111; elongation, 4.5%. Tests of the metal are being made in subway train service and by various other concerns, it is stated, and wide acceptance by these and other users, such as railroads, locomotive builders, electrical manufacturers, machinery builders, etc., is said to be assured.

"Boyerite" Casting Alloy

An advantage stressed is the fact that as a casting the metal will polish to a lustre comparable to nickel and chromium plate, providing a solid, polished metal with acid resisting qualities and hydraulic and oil pressure of 2,700 pounds per square inch, making it useful for plumbing fixtures, valves, automotive accessories, etc., which would require only polishing for a finish, according to the maker.

New Flexible Shaft Machine

A new belt-driven flexible shaft machine now obtainable from distributors and jobbers provides four different speeds—950, 1250, 2400 and 3600 r.p.m. It is available in all popular horsepower sizes and in all styles of mountings—overhead or vertical, trolley, floor or stand, bench or horizontal. A complete line of tools and attachments for all flexible shaft uses are included. Among these are mill cut rotary files which are said to give two to eight times longer service than ordinary files.

New "U. S." Flexible Shaft Machine

Many other advanced features are claimed by the makers including a spiral bearing the full length of the housing, improved slide couplings that take up all end play, and a new ball bearing hand piece.

Full particulars can be had from jobbers and distributors, or from the manufacturers, The United States Electrical Tool Company, Department 41, 2490 West Sixth Street, Cincinnati, Ohio.

Aluminum Alloy

A new aluminum alloy, known as "Usco No. 99," has been placed on the market by the U. S. Reduction Company, East Chicago, Indiana. This is stated to be highly resistant to corrosion and to be susceptible to a high, lustrous polish which is durable under severe conditions. The alloy is said to cast freely and produce dense, uniform castings which can be machined and finished easily.

Laboratory Rolling Mills

United Engineering and Foundry Company, Pittsburgh, Pa., offers a line of small rolling mills which have been developed from commercial designs, for use in laboratories, schools, and plants where experimental work in hot or cold rolling is done. The mills are suitable for small hot or cold rolling of strips, rounds, squares and simple shapes in ferrous or nonferrous metals or alloys. They consist essentially of motor, gear drive, pinion stand and coupling equipment, all assembled on one bedplate of welded steel construction, making a self-contained unit. The machines require up to about 50 horsepower, depending upon the work.

Motor and Generator Brushes

Perfection Supply Company, 98 Park Place, New York City, offers a line of all types of brushes for electric motors and generators. This includes brushes made of carbon and graphite, woven copper and bronze wire, copper leaf, and copper-graphite composition.

This company also manufactures the "Perfection" brush holder, said to be a simple and durable box holder, with spring adjustable lever giving even pressure throughout life of brush. Once set, they state, the brush holder allows no variation of position on the commutator with wear of brush, which is said to be a necessary condition with direct current interpole machines.

Nickel-Iron Magnetic Alloy

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., has developed a new magnetic alloy, known as "Hipernik," a product which, it is claimed, will have many practical applications and eventually save the world millions of dollars annually.

It is a refined iron-nickel alloy, produced by annealing the material in an atmosphere of hydrogen at a temperature of from 1,000 to 1,300 degrees for many hours, thus removing small amounts of impurities, chiefly oxygen, from the ordinary 40-60 per cent silicon iron-nickel alloy. The name, "Hipernik," is formed from the first syllables of the words "high permeability nickel."

Metal Polish and Cleaner

Zucker Sons' Company, Inc., Roselle, N. J., announces "Stainox," a polish and cleaner for all metals, glass, porcelain, etc. It is sold for domestic as well as industrial applications, and the manufacturer claims for it such advantages as non-inflammability, non-poisonousness, and that it is not greasy, or injurious to skin or clothing. Among the metallic surfaces it will clean and polish the maker mentions chromium plate, stainless steel, carbon steel, nickel silver, nickel plate, aluminum, pewter, copper, bronze, brass, and tin.

The product is sold in all quantities from half-pints up. It is a heavy solution which is applied with a damp cloth or on a cork, depending upon nature of work, and allowed to dry before being wiped off.

Silverware Burnishers

Josiah Anstice and Company, Inc., Rochester, N. Y., offers a variety of burnishing equipment of small size, designed for cleaning and burnishing flat and hollow silverware. The machines are made in capacities ranging from 60 to 160 pieces. Advantages claimed for the machines include high efficiency, durability. Rinse tanks and tubs in which the burnishing barrels revolve are made of heavy bronze castings. Bronze and steel worm gears are held in oil-tight housings. Special ball traps for sewer connection are provided to prevent loss of burnishing balls and also to exclude sewer gas. A special feature mentioned is a basket arrangement for removing work, eliminating danger of operators being injured by cutlery.

The company also manufactures "Scap," a silver cleaning and polishing compound.

Iron for Die-Casting Equipment

Vulcan Mold and Iron Company, Latrobe, Pa., offers "Vulc-Iron," which is stated to be an exceptionally suitable iron for use in the die-casting industry in such applications as pig molds, goose necks, ejector boxes and melting pots. The iron is stated to be the result of years of experience by this company in production of such products as solid and split molds, pig molds for all kinds of ferrous as well as nonferrous metals. The company is prepared to supply "Vulc-Iron" castings in all shapes from its foundry of 3,000 tons capacity, and its complete modern pattern shop. Advantages of "Vulc-Iron" for use in the die-casting equipment mentioned are said to include extremely long life, freedom from checking and cracking, consequent decreased operating costs.

Equipment and Supply Catalogs

Power Tranmission. Link-Belt Company, Chicago, Ill. Booklet, "A Saving at Every Turn," on positive drives.

Headlight Device. New England Manufacturing Company, Inc., Whitehall, N. Y. Leaflet on glare preventive device.

Heating Elements and Units. Harold E. Trent Company, 618 North 54th Street, Philadelphia, Pa. Leaflet.

Potentiometer Pyrometers. The Brown Instrument Company, Philadelphia, Pa. Catalog No. 1101, profusely illustrated.

Platinum, Palladium and Rhodium Plating. Baker and Company, Inc., 54 Austin Street, Newark, N. J. Leaflet, "Why Paint the Lily?"

Aluminum Alloy. Apex Smelting Company, 2554 Fillmore Street, Chicago, Ill. Leaflet on "Perm-A-Brite," a new, lustrous aluminum alloy.

Aluminum Bronze Die Castings. Aurora Metal Company, Inc., 615 West Park Avenue, Aurora, Ill. Bulletins 1 and 2, illustrated.

Wilco Thermometal. The H. A. Wilson Company, 97 Chestnut Street, Newark, N. J. Bonded bimetals. The book contains considerable engineering data on the subject.

Journal of Calendar Reform. The World Calendar Association, Inc., 485 Madison Ave., New York. June number, Vol. 1, No. 1.

Fire Extinguisher. Autofyrstop Company, 2035 Washington Avenue, Philadelphia, Pa. Leaflet on a new combined fire extinghisher and alarm developed by a subsidiary of Merchant and Evans Company.

Nickel Silver. The Riverside Metal Company, Dept. M 1, Riverside, Burlington County, New Jersey. Beautifully printed and illustrated booklet on all phases of production and uses of nickel silver manufactured by this company.

Tantalum in the Process Industries. Fansteel Products Company, Inc., North Chicago, Ill. A new bulletin describing applications of tantalum to products fabricated by a new process known as "electro-fabrication."

Continuous Heat-Treating Furnace. W. S. Rockwell Company, 50 Church Street, New York. Bulletin 312. Sectional conveyor type furnace for annealing, hardening, tempering, normalizing, etc.; electric or fuel.

Induction Motors. Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Type CS motors with sealed sleeve bearings, in all commercial frequencies and voltages.

Stoneware. General Ceramics Company, 71 West 35th Street, New York. Leaflet and circulars on acid-proof chemical stoneware, a hydrogen sulphide generator, and an improved suction filter.

Industrial Chemicals. The Roessler and Hasslacher Chemical Company, 10 East 40th Street, New York. First issue of a quarterly price list of chemicals for industrial purposes. Well printed booklet, alphabetically arranged, for handy reference.

Television. New York Telephone Company, New York City. "Through Electrical Eyes," an elementary exposition of the physics and chemistry involved in television. "Two-Way Television," describing television and giving a pictorial account of its background.

Silicate of Soda Cements. U. S. Stoneware Company, Akron, Ohio. "Quick-Setting Silicate of Soda Cements for Acid-Proof Tank and Tower Construction," by Foster Dee Snell and Howard Farkas, reprinted from "Industrial and Engineering Chemistry."

Register of American Exporters. American Manufacturers Export Association, 401 Broadway, New York City. A list of members of the association who are manufacturing for export, distributed gratis to 50,000 buyers in 147 countries, it is stated. Metal manufacturing exporters are included, it is stated.

Aluminum. The National Smelting Company, Grant Avenue, near 71st Street, S.E., Cleveland, Ohio. Bulletin A1, "Fluxing Aluminum"; Bulletin A2, "Melting Equipment for Aluminum"; Bulletin A3, "Melting and Pouring Aluminum"; Bulletin A4, "Pinholes in Aluminum Castings." Technical information for aluminum foundries.

Industrial Chromium Plating. Worthington Pump and Machinery Corporation, Harrison, N. J. An excellent 12-page pamphlet on applications of chromium plating to industrial uses, such as for wear and corrosion resistance on machinery. Good illustrations and complete engineering details are given, especially data on friction and corrosion resistance of chromium plate.

Industrial Finishing Products. The Gilbert Spruance Company, Richmond and Tioga Streets, Philadelphia, Pa. A descriptive and informative catalog of many pages, bound in paper, showing the complete Spruance line of lacquers, enamels, varnishes, paints, stains, fillers and other products used in industry for preservative and decorative finishing. There is a complete index, and a considerable amount of useful general data such as conversion tables for temperatures, measures, etc.

Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE VARIOUS ORGANIZATIONS

AMERICAN ELECTROPLATERS' SOCIETY

Los Angeles Branch

HEADQUARTERS, CARE OF M. D. RYNKOFS, 1354 WEST 25TH STREET, LOS ANGELES, CALIFORNIA

Los Angeles Seeks 1932 Convention

Representatives of the Los Angeles Branch are planning to present at the A. E. S. convention at Rochester a request that the 1932 convention be held at Los Angeles. The Los Angeles Branch believes the plan for such a convention is feasible, and will advance as arguments in favor of it the following facts:

The Olympic Games will be held at Los Angeles in 1932, bringing people there from all parts of the globe. A world convention of platers could be arranged by extending invitations to platers of Europe, Japan, etc., if the A. E. S. approved of such an idea. The trip to the coast will be very enjoyable, a gala event in most people's lives. An option is already being held by the Los Angeles Branch on the Alexandria Hotel, leading convention headquarters hotel of the city; this will insure members and guests of rooms at $4 and $6 rates as against the $10 and $15 rates that will obtain due to the Olympics; this would offset most of the extra fare costs, especially if a train is chartered from the middle west; excursion rates will be in force during the Olympics. The attractions of California are well known; it would be a wonderful two-weeks vacation for anyone.

The employers of platers will be circularized to help platers obtain the necessary leave of absence for such a convention, and to invite the employers themselves to attend. The various Branches are already being circularized for support of the proposition when it comes up before the Rochester Convention this month.

M. D. RYNKOFS, Secretary-Treasurer.

Bridgeport Branch

HEADQUARTERS, CARE OF T. H. CHAMBERLAIN, 859 ORANGE STREET, NEW HAVEN, CONN.

The Branch held a meeting May 5 at which the officers for 1931-32 were elected, as follows: President, J. Sexton; vice-president, B. Kusterer; secretary-treasurer, T. H. Chamberlain (re-elected); librarian, H. Braun (re-elected); sergeant-at-arms, John C. Barry; board of managers: John Oberender, W. G. Stratton, W. Thompson; delegates to national convention: R. J. O'Connor, G. Wagstaff, W. Bridgett, and as alternates W. Ehrencrona, A. Seafahrt and B. Kusterer. Installation was held June 5, at Ray O'Connor's "Barn." A get-together of the chemistry class was held there the same evening. The class had 28 members during the term. An advanced chemistry class is being considered for next fall.

Floyd T. Taylor gave a talk at the May 5 meeting on the papers on electrodeposition presented at the last meeting of the American Electrochemical Society. T. H. CHAMBERLAIN, Secretary.

New York Section, Electrochemical Society

N. Y. SECTION HEADQUARTERS, CARE OF RESTON STEVENSON, C. C. N. Y., 140TH STREET AND CONVENT AVENUE, NEW YORK CITY

The last meeting of the New York section for this season was held on Friday, May 22, at 8 p. m., in the theatre of the Westinghouse Lighting Institute, on the seventh floor of the Grand Central Palace, at 46th Street and Lexington Avenue, New York City. The meeting was preceded by an informal dinner at 6:30 p. m., at Hotel Shelton, 49th Street and Lexington Avenue.

The meeting began with the election of officers.

Dr. A. Brann, of the Engineering Department, Westinghouse Lamp Company gave a short talk on "The Chemistry of the Incandescent Lamp." The principal address was made by Dudley Willcox, treasurer and assistant manager of the Ajax Electrothermic Corporation, upon the subject: "Recent Coreless Induction Furnace Developments." RESTON STEVENSON, Secretary.

American Society for Testing Materials

HEADQUARTERS, 1315 SPRUCE STREET, PHILADELPHIA, PA.

Annual Meeting, June 22-26

As announced in the previous issue, the 34th Annual meeting of the American Society for Testing Materials will take place at the Hotel Stevens, Chicago, Ill., June 22-26, inclusive. Sixteen sessions will be held, mornings, afternoons and evenings, excepting Wednesday afternoon, June 24, when the Edgar Marburg Lecture will be given, followed in the evening by the dinner and annual dance and smoker; and Thursday afternoon, which has been reserved for golf and tennis tournaments.

Of special interest to the metallurgical industries will be a Symposium on Effect of Temperature on the Properties of Metals, arranged as a joint session with the American Society of Mechanical Engineers.

For the first time in its history the Society will sponsor an exhibit of testing apparatus and machines in conjunction with the annual meeting.

For all details as to reservations, transportation, or any other information in connection with the meeting, members should refer to the April Bulletin of the Society, or to the secretary, at the headquarters given above.

Exposition of Chemical Industries

One of the most successful industrial exhibitions ever staged took place recently, when the 13th Exposition of Chemical Industries was held in Grand Central Palace, New York, from May 4th to 9th. It broke all records for attendance and interest. More than 103,000 visitors viewed the displays of some 360 exhibitors, and attended the events which took place throughout the week.

Recent years have seen tremendous progress in the chemistry of metallurgy and recent chemical expositions have reflected these advances. The enormous losses due to corrosion have set up a challenge that the metallurgist has met with a great measure of success in the last few years. Special alloys have come on the market for a long list of exacting industrial demands, from exposure to weather to the terrific exactions of high temperatures and corrosive chemicals. Considerable chrome-nickel, stainless and heat-resisting steel was shown at the Exposition. Corrosion resistant alloys such as Monel metal and others also were included. Rare and useful metals and alloys displayed in greater quantity than at any show heretofore included molybdenum, tungsten, tantalum, vanadium and platinum. Rhenium metal, or the new element No. 75, created quite a sensation of its own at the Chemical Show, where it was shown in quantity for the first time. The bottleful exhibited was barely four inches tall, by one inch wide and was valued at more than three thousand dollars by Charles Hardy, who loaned it for display in the booth of the Chemists' Club. This new metal, which first was discovered by Dr. and Mrs. Noddack of Berlin in 1925 by use of an X-ray spectograph, is heavier than gold and has a melting point of 3,440° centigrade, which is higher than tungsten. When real quantity production can be achieved it is believed that rhenium will prove useful in the radio industry and in television apparatus. Gallium, a metal which melts at blood temperature, also was loaned by Mr. Hardy for exhibition.

Exhibitions of interest to the metal industries were the following:

Acme Coppersmithing and Machine Company, Philadelphia, Pa. Plant equipment in aluminum, bronze, copper, brass, Monel metal, nickel silver, Allegheny metal.

Ajax Electrothermic Corporation, Trenton, N. J. Coreless induction furnaces for metal melting.

American Hard Rubber Company, New York. Hard rubber for tank linings.

Baker and Company, Inc., Newark, N. J. Platinum-rhodium ware.

Barnsdall Tripoli Company, Seneca, Mo. Tripoli for metal polishing.

J. Bishop and Company Platinum Works, Malvern, Pa. Platinum crucibles and dishes.

Bristol Company, Waterbury, Conn. Pyrometers and recording instruments.

Brown Instrument Company, Philadelphia, Pa. Pyrometers and recording instruments.

Dings Magnetic Separator Company, Milwaukee, Wis. Magnetic separators for metals.

Dow Chemical Company, Midland, Mich. Magnesium alloys.

Duriron Company, Inc., Dayton, Ohio. Alloy steel castings for corrosion resistance.

Foxboro Company, Foxboro, Mass. Recording instruments; temperature and electrical control instruments.

General Ceramics Company, New York. Chemical stoneware.

Hellige-Klett, Inc., New York. Comparators for hydrogen ion control (pH).

Hybinette, Victor, Wilmington, Del. Hybnickel alloys of nickel and chromium for heat and corrosion resistance.

International Nickel Company, Inc., New York. Monel metal and pure nickel in various forms and manufactured products.

Knight, Maurice A., Akron, Ohio. Chemical stoneware.

LaMotte Chemical Products Company, Baltimore, Md. Comparators for hydrogen ion control (pH).

Hoke, Inc., New York. Torches for soldering and brazing.

Leeds and Northrup Company, Philadelphia, Pa. Comparators for hydrogen ion control (pH).

National Lead Company, New York. Lead lined and tin lined pipes and fittings made by the "United" process.

Newark Wire Cloth Company, Newark, N. J. Wire cloth in various metals and alloys.

Quigley Company, Inc., New York. High temperature fire brick cement. (Hytempite).

Taylor and Company, Inc., W. A., Baltimore, Md. Slide comparator for colorimetric pH control.

U. S. Stoneware Company, Akron, Ohio. Chemical stoneware.

American Zinc Institute

HEADQUARTERS, 60 EAST 42ND STREET, NEW YORK CITY

The American Zinc Institute has endorsed a program under which a definite plan for increasing the use of zinc by adoption of standards for galvanized (zinced) sheets. At the recent annual meeting at St. Louis, Julian D. Conover, secretary of the Institute, stated that an adequate protective coating of zinc, resulting in a longer-lived product, is the fundamental requisite in promoting a wider use of galvanized sheets.

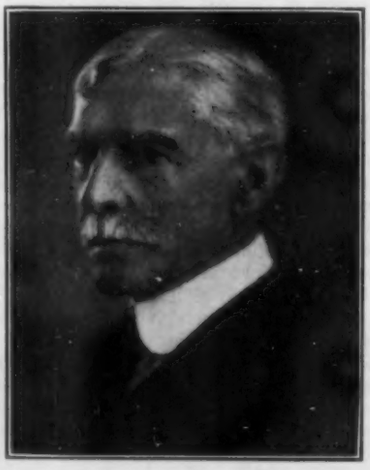
1931-32 Officers

The annual election of officers of the Institute resulted in the re-election of the following: R. M. Roosevelt, president; A. P. Cobb, John A. Robinson, and J. O. Elton, vice-presidents; Howard I. Young, treasurer; and J. D. Conover, secretary. The following nine directors, succeeding those whose terms expired this year, were elected for the term expiring in 1934: A. E. Bendelari, J. A. Caselton, C. M. Chapin, Jr., F. Childress, A. P. Cobb, A. J. McKay, C. T. Orr, W. N. Smith, E. H. Wolff.

Personals

John F. Harman

John F. Harman, dean of the silver industry, chairman of the board of directors of Handy and Harman, New York, retired from that position on May 1, when he celebrated his 87th birthday. He had been with the company continuously for 64 years, during which he served with three generations of the Handy family, one of whom, Cortlandt W. Handy, is now president of the company.



JOHN F. HARMAN

John F. Harman was born May 1st, 1844, near Harper's Ferry, Va. At the close of the Civil War, in the year 1865, he came to New York City and entered the employ of J. S. Cronise and Company at 37 Wall Street, who were engaged in the bullion and specie business. In 1866 he became associated with Baker and Bushong, dealers in stocks and gold, located at the corner of Wall and Broad Streets, on the site of the present office of J. P. Morgan and Company. Mr. Harman and Mr. Cronise went into business with Peter Hayden in 1867, at 24 Nassau Street, and engaged in business as bullion and specie dealers. In 1869 Parker Handy bought this business and operated as private banker and dealer in bullion and specie under the title of The Banking House of Parker Handy until 1879, when the partnership of Handy and Cronise was formed. In 1886, upon the retirement of Mr. Cronise, the partnership name was changed to Handy and Harman.

From the establishment of this business until 1901 its operations consisted of banking and dealing in bullion, specie, and bonds. For some years the New York Stock Exchange had a "silver post," which was discontinued about 1900, and Parker Douglas Handy, who was a member, handled the securities business and the silver trading on the floor of the Exchange.

In 1901 Handy and Harman became affiliated with the Standard Metal Company of Chicago, Ill., which was engaged in the melting, rolling and refining of precious metals. For one year the operations of the Standard Metal Company were continued in Chicago, but in 1902 the plant was moved to Bridgeport, Conn., and in 1905 the firm was incorporated under New York State laws with the name of Handy and Harman, at which time a further consolidation was effected with the Charles S. Platt Company. The Platt company was the successor to Platt and Brother, which began the manufacture and refining of precious metals in New York City in 1824.

Mr. Harman was elected vice-president of the company upon its incorporation in 1905 and has since held the office of vice chairman and chairman of the board of directors.

Dr. Mortimer J. Brown, formerly assistant vice-president and a director of the Roessler and Hasslacher Chemical Company, New York, has been elected a vice-president. Dr. Brown, who is connected with the company's Niagara Falls,

N. Y., division, received his Ph.D. degree at Cornell University in 1911, in which year he also joined R. & H. as a chemist in its Niagara Falls plant. In 1917 he was transferred to the Perth Amboy plant to install an electrolytic process for the production of raw materials for cyanides, of which a shortage existed because of the World War. In 1919 he was sent to California to be resident executive of the Pacific R. & H. Chemical Corporation. Dr. Brown returned in 1923 to the Niagara Falls plant as assistant to second vice-president. In 1926 he was made general superintendent of the plant and also a director, and in 1929 assistant vice-president of the company. He is also vice-president of the Pacific R. & H. Chemical Corporation. He will continue to make Niagara Falls his headquarters.

Dr. E. A. Rykenboer, formerly general superintendent and a director, has been elected a vice-president of the Roessler and Hasslacher Chemical Company, New York. Dr. Rykenboer, graduated from the University of Rochester in 1912 and took his Ph.D. degree at the University of Michigan in 1917. The same year he joined R. & H. as a research chemist in its Niagara Falls plant, where he later became senior chemist. Dr. Rykenboer was appointed production superintendent of the Niagara Falls plant in 1926, and in 1929 became the general superintendent. In September, 1930, he was made a director of the company. He remains general superintendent of the company. He will be in charge of all plant operations and also general traffic, advertising, service and related company activities. He is also a director of the Niacet Chemical Corporation, Niagara Falls, N. Y. His headquarters will continue to be Niagara Falls

Colby Dill, formerly assistant vice-president, has been elected secretary of the Roessler and Hasslacher Chemical Company, Inc., New York. A Harvard graduate (1904), Mr. Dill received his M.Sc. degree at Massachusetts Institute of Technology in 1907, and in 1908 joined the R. & H. organization as works manager of the subsidiary, Perth Amboy Chemical Works, Perth Amboy, N. J. In 1925 he was made assistant treasurer and a director of the company, and in 1926 general superintendent of the Perth Amboy plant. He was elected assistant vice-president in 1928. His headquarters will be in New York.

S. M. Jenkins has been made assistant sales manager in charge of high temperature insulation of the Armstrong Cork and Insulation Company, Cleveland, Ohio. Mr. Jenkins was formerly in charge of special sales work relating to high temperature insulation, for the Armstrong Cork and Insulation Company of Lancaster, Pa., making his headquarters at Cleveland. He will now have headquarters at Lancaster, where he succeeds **J. L Allison,** who is in charge of office personnel.

Obituaries

Harry D. Cushman

Harry D. Cushman, president of the Ferro Enamel Corporation, Cleveland, Ohio, died May 9, 1931, in his fifty-eighth year. Mr. Cushman was born at Three Rivers, Mich., in 1874, graduated from Albion College in 1897, and started his career in the steel industry at Cleveland. Interested in the development of the porcelain enameling industry, Mr. Cushman founded the Ferro Enameling Company in 1919, manufacturing prepared frits and liquid enamels. He made a large contribution to the industry which he was instrumental in bringing to its present advanced state. A strong and resourceful man, he held the respect and admiration of all his associates and employees.

William R. Peters

William R. Peters, retired head of Peters, White and Company, New York, chemical firm, died recently at the age of 80. Mr. Peters founded the chemical firm of Peters and Tiemann, which later became William R. Peters and Company, then Peters, White and Company. He was also a director of Mutual Chemical Company and Phosphate Mining Company. He retired in 1916.

Frank Metzger

Frank Metzger, 60 years old, head of the Metzger-Thresher Plating Works, at 303 West 129th Street, New York, was killed last month when the stone coping to which ropes for hoisting machinery to the second floor of the plant broke and allowed a 3,500-pound generator, which was being raised, to fall upon him.

Edward B. Evans

Edward B. Evans, manufacturing jeweler, of Providence, R. I., died April 5, 1931, after a short illness.

Robert F. Delaware

Robert F. Delaware, sales manager for the White Brass Castings Company, Kankakee, Ill., died recently, in Chicago.

Dr. Wiley Lyon Kingsley

Dr. Wiley Lyon Kingsley, 64, former president of the Rome Manufacturing Company, Rome Brass and Copper Company, Rome Metal Company, Rome Locomotive and Machine Works, and the Rome Turney Radiator Co., Rome, N. Y., died suddenly on April 6, 1931 at Palm Beach, Fla.

W. C. Holzworth

W. C. Holzworth, for several years identified with the Pittsburgh office of E. J. Lavino and Company, Philadelphia, died suddenly at his home in Pittsburgh on April 2, 1931, aged 43 years. Mr. Holzworth was born at Lancaster, Pa., and joined the Lavino company at Philadelphia 11 years ago.

Emil Jacobson

Emil Jacobson, 78 years old, secretary, Edna Brass Mfg. Company, Cincinnati, died recently. He was born in Manchester, England, came to this country and settled in Cincinnati when he was 20 years old. He had been associated with the Edna company for 30 years.

Aaron Rodewell Todd

Aaron Rodewell Todd, who retired some years ago after 40 years with the Hanson-Van Winkle Corporation, Newark, N. J., now part of the Hanson-Van Winkle-Munning Company, Matawan, N. J., died May 2, 1931, at Washington, D. C.

Maurice D. Brown

Maurice D. Brown, formerly plant superintendent of the National Conduit and Cable Company, died of pneumonia at Yonkers, N. Y., on March 22, 1931.

William F. Prier

William F. Prier, founder and president of the Oregon Brass Works, Portland, Ore., died recently.

News of the Industry

Industrial and Financial Events

Developments in Metals

CLASS M SLOOP "PRESTIGE," owned by Harold S. Vanderbilt, equipped with a new type of duralumin mast, was tried out last month.

ALUMINUM orders totalling 6,000 tons, at an average price of 17.19c. per pound, were placed by Soviet Russia with the Continental Aluminum Cartel, European producers, last month. The price was 1.56c. per pound below the open cartel quotation; reduction was said to have been brought about by American competition.

PLATING WITH CHROMIUM, sheathing with corrosion resistant alloys and other methods involving use of alloys are being tested for protection of turbine blades designed to operate at very high speeds.

"PERM-BRITE" is a new aluminum alloy developed by Apex Smelting and Refining Company, Chicago, Ill. Adapted to sand or die casting, rolling, forging, drawing, hot or cold working, etc., the makers claim for the alloy high resistance to corrosion, lower specific gravity than pure aluminum, tensile strength of 24,000 to 26,000 pounds per square inch for sand-cast specimens.

ZINC is reported to be gaining in popularity abroad as material for furniture, interior architecture, etc.

LEAD is being applied to the lining of shower baths, due to its easy workability and resistance to corrosion by water, according to the Lead Industries Association.

AJAX METAL COMPANY, Philadelphia, Pa., has adopted the "universal vacation plan," under which all of its employees will take their vacations at the same time, the plant shutting down from July 3 to July 20, during which time no shipments will be received.

METALS of several kinds, said to be worth $250,000, were discovered last month when police of New York and Jersey City, N. J., uncovered the fraudulent activities of Joseph Price and "Col." Telamon Cuyler, operating a fake company known as Brydges and Dart, which ordered large shipments of solder, copper and other metals delivered on credit to several warehouses, from which they were removed for resale before being paid for. Price, who gave the aliases "Charles Brooks" and "Richardson," said Cuyler was the "brains" of the scheme. Both men are to be prosecuted in New Jersey.

223 MILES PER HOUR is the speed at which a train could be run if built according to a project explained to engineers last month by Prof. F. Wiesinger of Zurich Polytechnicum, at Geneva, Switzerland. The train would have coaches of aluminum alloy and be driven by propellers; wheels would be inclined 30 degrees instead of vertical, to prevent derailment.

ALUMINUM sheet, plate and paint are being used extensively in construction of the new Municipal Stadium at Cleveland, Ohio. About 70 tons of the metal are used to cover the upper 45 feet of a 100-foot wall circumscribing the oval bowl, perimeter of which is about a mile. All steel work is covered with aluminum paint.

METAL MESH SCREENS for talking motion picture projection are being manufactured by the Mandalian Manufacturing Company, North Attleboro, Mass., manufacturers of mesh bags, watch bracelets, etc. The new product is said to be the most perfect screen yet devised, providing highest light reflection, clearest view from any angle, and best sound distribution. It costs ten dollars a square foot.

AMERICAN BRASS COMPANY is reclaiming land on Naugatuck River at Ansonia, Conn., using a huge dredge weighing 185 tons, capable of removing four cubic yards of earth at each scoop. Course of river is being changed to give company about a mile more land for plant additions.

ALUMINUM ALLOY main and side rods have been installed on a steam locomotive built by Baldwin Locomotive Works for the Alton & Southern Railroad, at East St. Louis, Ill. Other parts were also made of aluminum, including valve gears, running boards, steps, etc.

FANSTEEL PRODUCTS COMPANY, North Chicago, Ill., has announced production of "electro-fabricated" tantalum products, consisting of thin layers of tantalum backed by copper which is plated on.

ZINC CONSUMPTION in manufacture of primary batteries in United States in 1930 totaled about 15,859 tons, as against 20,942 in 1929, American Bureau of Metal Statistics reports.

POLISHING increases the strength and lengthens the life of automobile springs considerably, according to the findings of British investigators. They state that if the leaves of springs are machined and polished separately, the spring assembly will be from 20 to 50 per cent stronger than the same springs unpolished.

ALUMINUM, as a material for the construction of oil-lease tanks, has been found to have certain promising possibilities because of its resistive behavior in the presence of corrosive hydrogen sulphide gas, but the operating conditions of the tank batteries must be controlled to prevent the corrosive action of concentrated brines on the aluminum tank plates, concludes the United States Bureau of Mines, Department of Commerce, following a series of tests on tanks of this construction.

Wire Screen Cloth Simplification

A general conference on the simplification of wire screen cloth will be held at the Hotel Biltmore, New York, at 10:30 a.m., Thursday, June 18, 1931, under the auspices of the Division of Simplified Practice. Producers, distributors and users of wire screen cloth are invited to attend. Those unable to attend are requested to send written comments or suggestions, addressing George Schuster of the Division of Simplified Practice, Bureau of Standards, Department of Commerce, Washington, D. C. A simplified practice recommendation will be developed for steel and bronze wire cloth, affecting mesh and wire sizes, roll widths and lengths, packing, etc.

Brass Ingot Statistics

Non-Ferrous Ingot Metal Institute, Chicago, Ill., reports the average prices per pound received by its membership on commercial grades of ingot brass during the twenty-eight day period ending April 24th, as follows:

Commercial 80-10-10 (1% impurities), 10.301c; commercial 78%, 8.902c; commercial 81%, 9.027c; commercial 83%, 9.244c; commercial 85-5-5-5, 9.458c; commercial No. 1, 7.619c.

The combined deliveries by the members for the month of April amounted to 4,238 tons.

On May 1st, unfilled orders on books of members amounted to 21,998 net tons.

Roessler and Hasslacher Personnel

At the regular annual meeting of the directors of The Roessler and Hasslacher Chemical Company, Inc., in New York City, April 27, the following officers were elected to serve for the ensuing year: Chairman of the board, W. F. Harrington; President, Hector R. Carveth; Vice-president, Mortimer J. Brown; Vice-president and Secretary, Colby Dill; Vice-president, Milton Kutz; Vice-president, E. A. Rykenboer; Treasurer, Albert Frankel; Assistant Treasurer, August Heuser; Assistant Secretary, M. D. Fisher; Assistant Secretary, E. A. Howard; Assistant Secretary, J. Carlisle Swaim.

(See pages 274 and 275.)

Cramp Brass and Iron Foundries

Cramp Brass and Iron Foundries Company of Philadelphia, Pa., subsidiary of Cramp Morris Industrials, Inc., has been purchased by the Baldwin Locomotive Works, Philadelphia, together with certain other Cramp Morris subsidiaries, including I. P. Morris and De La Vergne, Inc., Iron Foundries Company, Federal Steel Foundry Company, Chester, Pa., and Pelton Water Wheel Company, San Francisco, Calif.

Corporation Reports

WINCHESTER REPEATING ARMS COMPANY, New Haven, Conn., now in receivership, reports operating loss of $88,787 over the period from January 22 to February 28, 1931.

ANACONDA WIRE AND CABLE COMPANY: Net profit for quarter ended March 31, $161,465 after charges, against $59,417 for same 1930 period.

NEW JERSEY ZINC COMPANY: Net profit for quarter ended March 31, $860,769, as against $1,671,867 for same 1930 quarter.

INTERNATIONAL NICKEL COMPANY OF CANADA, LTD. Net profit for first quarter of 1931, $1,659,637, against $4,616,144 in corresponding quarter last year. The quarterly report issued to stockholders included the first of a series of sketches describing uses of nickel.

UNITED ENGINEERING AND FOUNDRY COMPANY: Net income for 1930, $2,114,359, as against $1,671,887 for 1929. PRESIDENT G. T. LADD told stockholders outlook for company is promising, business already booked indicating 1931 earnings will approximate those of 1930.

New Companies

CARNEGIE FOUNDRY AND MACHINE COMPANY, Carnegie, Pa., organized by E. L. MCWILLIAMS and associates, with $10,000 capital, is operating foundry formerly conducted by The H. L. DIXON COMPANY, at Rosslyn Road, specializing in mold castings for glass house use. Company makes a high grade heat resisting iron, casts brass, bronze, copper and other metals. States it is not in market for any equipment.

Business Reports of The Metal Industry Correspondents

New England States

Waterbury, Connecticut

JUNE 1, 1931.

Output of the **American Brass Company** in 1930 fell off 37% as compared with 1929, the boom year which broke all records, according to the company's financial report for the year. Total 1930 production was 436,265,637 pounds, compared with 695,059,213 pounds for 1929. The 1928 production was 778,397,151 pounds. **Anaconda Copper Mining Company,** parent company of the local concern, showed a net profit of $18,362,276 for 1930. The corresponding figure for 1929 was $69,115,000.

Scovill Manufacturing Company directors met last month and declared the regular dividend of 50 cents a share on the common stock, payable July 1 to stock of record June 15. While this is the same dividend maintained for nearly a year, somewhat over a year ago the regular quarterly dividend was $1.

Although the Common Council of Stratford, Conn., was informed last month that the **American Brass Company** planned to build a million dollar plant there if the dredging of the Housatonic River takes place, **President John A. Coe** of American Brass told THE METAL INDUSTRY correspondent that he knew of no such project and, as far as he is concerned, there is nothing to the report. **Councilman E. B. Sniffen** made the report at the Stratford meeting, saying that the company had decided not to build hereafter except at tidewater, and that officials of the company had assured him that it would erect a plant on property it now owns in the town on the bank of the river, between the railroad and the Washington bridge, provided the channel of the river is dredged.

Through the efforts of **Congressman E. W. Goss** of this city, who is an official of the **Scovill Manufacturing Company,** the Treasury Department has revised its specifications for the new post office building here so that brass, bronze and such metals will be used for the window frames and wherever building hardware is required. The original specifications called for aluminum, but Mr. Goss protested that it was not fitting that a rival metal should be used in a government-built building in the "Brass City."

Rodney Chase, assistant secretary of the **Chase Companies, Inc.,** expressed amusement at the report that the Cleveland plant of the company was running at full time. "I wish I could say it was," he said. "I doubt if any plant in the country is running full time now. The Chase Company keeps as much business here in the local plants as possible, handling at the Cleveland plant only such business as will benefit by economies afforded by short distance shipping of materials."

Officials of the **Waterbury Clock Company** profess no knowledge of a reported lay-off of 300 more employes after the first of last month, although it is definitely known that large numbers were laid off. It is understood that there are now about 1,200 on the payroll, compared with 2,500 a couple of years ago.

American Brass Company last month reduced the price of all its brass and copper products one-quarter of a cent a pound.

A small fire in one of the buildings of the **Scovill Manufacturing Company** last month was checked by the fire department before more than a few hundred dollars damage had resulted.

Lux Clock Manufacturing Company is exceptionally busy just now, having 600 employes on its payroll, the largest in its history. Although an addition was built last year, the officials are now discussing another addition. The manufacture of electric clocks is replacing the company's diminishing orders for alarm clocks. Clocks for stoves and electric refrigerators are being made in large numbers. —W. R. B.

Connecticut Notes

JUNE 1, 1931.

WINSTED—James Sweet has brought an action against the **Winsted Insulated Wire Company** asking appointment of a receiver and a decree dissolving the corporation. The complaint alleges that the corporation has 107 shares of preferred and 6,704 shares of common stock and that Mr. Sweet owns 3,285 shares of the common, that the company is insolvent and its assets in danger of waste through attachment and litigation. The company was organized by Mr. Sweet and associates about four years ago. About a year ago it purchased the Empire Knife Company building. For several years it did an excellent business, but is understood to have been badly hit by the depression. However, only recently it was reported to have received a large order for electrical coils and transformers, necessitating nearly a doubling of its present force of employes.

TORRINGTON—John McCarthy, 691 Prospect Street, an employee of the **American Brass Company** for 51 years, was retired on a pension last month at the age of 73. He entered the local factory when it was the **Coe Brass Company.** He was a foreman for nearly 40 years.

STAMFORD—Yale and Towne Manufacturing Company has declared the regular quarterly dividend of 50 cents a share, payable July 1 to stock of record of June 10. The net earnings of the company for the first quarter of this year were but $7,947, or 1 cent a share, compared with $130,422, or 27 cents a share, for the same period in 1930.

BRIDGEPORT—Sikorsky Aircraft Corporation has under construction at the local plant what will be the two largest amphibian planes ever built in this country. They are 46-passenger planes, intended for use in transatlantic mail service, the mail contract for which is being being sought by Pan American Airways, Inc. Four "Wasp" engines will furnish the power. The local factory was visited last month by a group of United States Air Service officials and representatives of the Chilean government.

George T. Wigmore of Naugatuck resigned as secretary, treasurer and director of the **Bridgeport Brass Company** June 1. Pressure of other business and a poor state of health were

given as the reasons. Mr. Wigmore is still active as treasurer of the **Risdon Manufacturing Company** of Naugatuck, and is a director of the Colonial Trust Company and the **Beardsley and Wolcott Manufacturing Company** of Waterbury. He was an officer of Bridgeport Brass for three years. **Felwyn Bywater** of a New York brokerage house has been named to succeed Mr. Wigmore as a director of Bridgeport Brass. No one has yet been named secretary and treasurer.

NEW HAVEN—Winchester Repeating Arms Company was operated at a loss of $88,787 in the period of January 22 to February 28, according to the report filed in the Federal Court by the receiver. Income was $124,000; expenses $168,677; $51,479 was charged against idle plant. Bondholders are reported to have deposited 75% of the issues to a committee named by **Receiver William A. Tobler** for that purpose. Similar action has been taken by holders of debentures. Officials deny that a reorganization is planned.

HARTFORD—Stockholders of **Underwood-Elliot Fisher Company** last month reelected the directors, and they in turn reelected the officers and members of the executive committee.

NEW LONDON—Officials of the **Electric Boat Company** hope that the contract for construction of the U. S. submarine "Cuttlefish" will be awarded to their firm. Two bids were offered, one for $3,297,000 and the other for $3,395,000. Delivery of the boat in 30 months is called for and delivery will be made in New London if the contract is awarded to the local concern.

MERIDEN—Directors of **International Silver Company** last month declared the regular quarterly dividend of one and three-quarters percent on preferred stock, payable on July 1 to stock of record June 12.

SOUTHINGTON—Directors of **Peck, Stow and Wilcox Company** transacted only routine business at their regular quarterly meeting last month. Reports presented indicated an improvement in the company's business.

W. R. B.

Middle Atlantic States

Newark, New Jersey

JUNE 1, 1931.

Imperial Appliance Corporation has leased floors in the four-story building at 123 Sussex Avenue. The total floor area leased is 10,000 square feet and will be used for the manufacturing of electrical appliances.

Metallo Gasket Company, 16 Bethany Street, New Brunswick, will erect a two-story brick addition to its factory, to cost $40,000. **Allied Tar and Chemical Corporation** will erect a plant addition at Elizabeth, to cost $40,000.

Standard Railway Fusee Corporation's assembly plant at Boonton, N. J., was destroyed by fire on May 14, with an estimated loss of $300,000. Firemen were compelled to keep some distance from the burning plant because of the explosives used in the manufacture of the fusee. Hundreds of thousands of the railway signals were saved by the sheet metal room of the big storage building. About fifty hands are employed at the factory, which is owned by **W. A. Luce,** of Boston. Valuable machinery was destroyed.

Vice-Chancellor Church has directed Emanuel P. Scheck, receiver for the **Interstate Sheet Metal Company** of 377 Frelinghuysen Avenue, to return all assets to the company. Scheck was appointed in January. He told the court the concern had effected a settlement with creditors whereby all would be paid in full over a period.

The following Newark concerns have been incorporated: **Metal Carbides Company,** alloy metals for tools, 1,000 shares common. **Insulite Products Corporation,** chemicals, 1,000 shares common. **American Welding and Machine Works,** 100 shares no par. **Rockland Chemical Company,** manufacture chemicals, 100 shares no par. **Sherwin Welding Company,** Elizabeth, $50,000 capital, general welding.—C. A. L.

Trenton, New Jersey

JUNE 1, 1931.

Judge John Boyd Avis in the United States District Court appointed J. Spencer Voorhees, of Trenton, and Royall D. Edsel, of New York, receivers for the **J. L. Mott Company,** Trenton, N. J., manufacturers of plumbers' supplies. The action was taken after a creditor for nearly $4,000 had made a request for a receivership. The receivers were given authority to take possession of goods and properties, and to operate and conduct the business. In setting forth their reasons for the receivership, Schenck and Schenck of Jersey City, creditors, stated that such an action would avoid the filing of individual suits by other creditors, and would in turn preserve the property for equitable distribution. It is further stated that operations of the Mott Company "for the year 1931 to date have also resulted in a net loss, the exact amount of said loss being unknown to complainant." The complainant charged that the firm had also suffered a loss during 1929, and that it had no net income for 1928. The latter declaration is made on the basis of a report made by the Internal Revenue Bureau. It is also charged that the bankers of the defendant have refused to make loans to the defendant sufficient to provide the working capital needed to continue operations.

President of the Mott Company is **George H. Laib. T. H. Eckerson** is vice-president and treasurer, and **Jordan L. Mott, 3rd,** is secretary. The Mott company was organized in 1828 in New York. In 1927, after several years of court difficulty, Federal Judge Bodine approved the sale of the plant to the **Laib Pottery Company,** Louisville, Ky. The sale price was $1,650,000. Reorganization followed the appointment of two receivers.

Duncan Mackenzie and **Michael J. Marcin,** directors of the **Duncan Mackenzie's Sons Company,** Trenton, N. J., have received from Washington, D. C., patents on a heat-resistant process which they regard as one of the most important metallurgical discoveries in recent years. After months of experimentation, the Trenton engineers claim to have hit upon a method of preventing disintegration of graphite, or carbon, under intense heat, a secret for which the graphite industry has searched in vain for 30 years.

Mr. Mackenzie says the process evolved by him and Marcin turns graphite almost as hard as a diamond and prevents oxidization of the material under temperatures of between 3,000 and 4,000 degrees Fahrenheit. Graphite is extensively used in the crucible and foundry industries. The treatment of graphite by the new process, Mr. Mackenzie says, will make crucible molds last for repeated usage. The process consists of treating the graphite with fumes from a chemical mixture whose content comprises the patented secret of the discovery. According to the patentors, the process is invaluable in laboratory experiments where terrific heat is employed. The treated graphite will be marketed under the trade name "Macmar." Its use ranges from a protective covering for pyrometer tubes to carbon sticks in motion picture projecting machines. According to the inventors, it revolutionizes the manufacture of stainless steel, alloys and precious metals.

C. A. L.

Central New York

JUNE 1, 1931.

Some improvement in domestic business of **Remington Rand, Inc.,** Ilion, more profits reported by **Savage Arms Corporation,** Utica, and progress of a subsidiary of the **Revere Copper and Brass** at Rome, are notes of encouragement in the Central New York area.

While the domestic business of the Remington Rand seems to be slightly on the upgrade, officials of the corporation state that foreign business is little if any better. Report of Remington Rand for the year ended March 31 shows consolidated net profit of $1,410,819 after depreciation, interest, federal taxes and minority interests, equivalent, after dividends on preferred stocks, to 11 cents a share on common stock. The net sales for Remington Rand for the year were $47,398,575, down $16,782,000 from the previous year.

So far this year the **Savage Arms Corporation,** Utica, has operated more profitably than in the same period of 1930. The actual value of shipments has been lower, officials of the corporation report. The reason for the more profitable condition is reduction in operating costs.

Rome Manufacturing Company, which is now a subsidiary of the Revere Copper and Brass, is manufacturing a product which is being used in this country while orders are now being filled for Hong Kong, China, Hawaii and several countries in South America.

General reports, however, from the Rome area, center of the New York State copper industry, are not encouraging.

Word from the **Oneida Community, Inc.,** this month is that they have a number of large accounts using products which they are making up in dull times. This keeps the workmen at their benches but are not giving a great deal of profit. E. K. B.

Rome, N. Y., metal concerns awarded $125 in prizes to employees in a safety drive, the awards being based on the workers' ability to avoid accidents. Companies participating included **Rome Brass and Copper Company, Rome Hollow Wire and Tube Company, Rome Manufacturing Company** and **Rome Grader Company. H. D. Wolfe,** general manager of the Rome plant of Revere Copper and Brass, addressed the meeting.

Middle Western States

Detroit, Michigan

JUNE 1, 1931.

Recent weeks have shown some improvement in general business in this area, but conditions are far from what they were a year ago and what was anticipated earlier in the season.

Those concerns in the non-ferrous industry allied with the manufacturing of motor cars and trucks, naturally, are making the best showing. Outside of this field, however, things are exceedingly quiet. Production of plumbers and steamfitters supplies is exceedingly low, and there is nothing particularly favorable in sight.

Production of automobile accessories in which brass, copper and aluminum are concerned has been improving from month to month. This naturally is governed by the production of motor cars. How long this will continue no one can say. Very likely there are several weeks of activity ahead in this field. Then will follow the usual seasonal decline and quiet.

Reports from the plating industry are only fair. There are some plants, however, that are quite active. In general, the industry is laboring under the handicap of the depression.

Following the hearing in circuit court to show cause why the **Kunkel Manufacturing Company,** Hart, Mich., should not be dissolved, the court appointed Herbert S. Newton as receiver. The Kunkel firm manufacture valve grinders and automobile heaters.

Acquisition of the radiator valve division of the **General Brass Company,** Detroit, by **James P. Marsh and Company,** Chicago, manufacturers of steam specialties, heating systems and industrial instruments, is announced by **A. D. Rose,** general sales manager of the latter concern. The Detroit company's manufacturing equipment has been transferred to the Marsh plant in Chicago. The Marsh company is a division of the **Commercial Instrument Corporation.**

The passing from the ranks of one of Detroit's pioneer industries was forecast recently by the filing of a petition for dissolution by a majority of the board of directors of the **Peninsular Stove Company.** Judge Arthur Webster of the Wayne Circuit Court named the Detroit Trust Company as temporary receiver, and set June 12 as the date for the hearing on the order to show cause why the petition should not be granted. A combination of circumstances are understood to have resulted in the petition for the dissolution of the company. The stove business has undergone drastic changes during recent years. Construction of new homes and the resultant demand for stoves and furnaces have constantly diminished during the past two years, along with the world-wide depression.

Oroxo Grinding Wheel Company, 693 Monroe avenue, Detroit, has recently been incorporated. This concern is engaged in the manufacture of abrasive materials. The owners are **Dr. Erwin Meyer, Charles J. Butler** and **George W. Seiberling.** The capital stock consists of 100,000 shares of no par value.

Ilewill Manufacturing Company, 37 Manchester avenue, Highland Park, Mich., has recently been chartered for the purpose of manufacturing wire and cable. The owners are **Addison E. Holton, Harold A. Strickland** and **William Ile.** The total capital stock consists of 145,000 shares of no par value.

Owing to an increase in business, **Pressed Metals, Inc.,** of Marysville, Mich., has made a substantial increase in the number of its employes, according to **J. W. Leighton,** president. This company makes bronze bushings. Screw machines have been installed at an approximate cost of $100,000, he reports.

Business of the **Long Manufacturing Company,** Detroit, a unit of the **Borg-Warner Corporation,** for the first quarter of 1931 was 10 per cent above that for the last quarter of 1930, it was announced recently by officials. The Detroit unit makes several types of automobile radiators. It also expects to add an important new product to its line before the end of the year, it is said.

Wingler Aeronautic Corporation, organized for the manufacture of flivver type biplanes, is temporarily located in buildings on the Imlay City, Mich., fairgrounds, where three planes of one- and two-passenger types are being constructed. The company will move into a new factory which is under construction east of Imlay City. It will be completed early in the summer.

At the recent annual meeting of the **Detroit Foundrymen's Association, James L. Mahon** was elected president; **Peter W. Mulder** vice-president; **Neil I. McArthur** secretary; **Fred A. Cowen** treasurer. Executive board: **Fred J. Walls, Harry Rayner, Leslie G. Korte, Vaughan Reid** and **Bert Crawford.**

Directors of the **Detroit Gasket and Manufacturing Company** have voted to accept a plan for a merger with the **Crown Cork and Seal Company, Inc.,** on the basis of exchange of two shares of Detroit Gasket for one share of Crown Cork. The offering is contingent upon holders of at least 95 per cent of Detroit Gasket assenting to the plan. It is reported that the largest holders, including all officers and directors, have entered into a formal agreement on the plan with Crown Cork and Seal.

Earnings of **Bohn Aluminum** during the last quarter showed an increase of 10 per cent as compared with the same period of 1930, according to a recent announcement. F. J. H.

Wisconsin Notes

JUNE 1, 1931.

Joseph Haupt, 28, assistant purchasing agent of the National Enameling and Stamping Company, Milwaukee, died at a local hospital on May 20, after a four-day illness. He is survived by his widow and a daughter.

Henry Vogts, president of the Madison Brass Works, Madison, has been elected a director of the Security State Bank in that city, according to an announcement by L. L. Lunenschloss, vice-president of the bank. Mr. Vogts is active in civic and fraternal affairs in Madison.

John Baas, foreman of the brass department of the **Hoffman and Billings Manufacturing Company,** Milwaukee, retired on May 1 after 62 years of service with the company. **Fred Hoffman,** president of the concern, presented Mr. Baas with a gold watch. There are ten other employes at the company, which was founded in 1855, who have served more than 41 years.

At the annual meeting of the **Metalware Corporation,** at Two Rivers, **Remus Koenig** of Manitowoc was re-elected president of the company. **Walter S. Marvin** was chosen

vice-president and general manager; **William Halberg,** secretary and treasurer; and **N. B. Wood,** purchasing agent and factory manager. Remus Koenig, Mrs. Ruby Ellis, William Halberg, W. S. Marvin and Simon Schwartz were named to the board of directors. Reports of the year's business were encouraging and it was stated that there was an increase in the orders particularly for toys and toy cooking utensils.

Articles of incorporation have been filed by the **Waukesha Nickel Plating Company,** Waukesha. Signers of the articles are F. Brunner, C. E. Mann and A. J. Baird. A. P. N.

Other Countries

BIRMINGHAM, ENGLAND, MAY 21, 1931.

The 21st annual May lecture of the **Institute of Metals** was given by **William B. Woodhouse** and entitled "The Progress of Power Production." He reviewed the development of power production throughout the world, and in particular the important question of the extent to which England, dependent as it is on coal for power production, can compete with water power in other countries in the production of cheap electricity for metallurgical and other industrial purposes. Electrical methods of treating ores and of producing and refining metals, he said, are being used to an extent which require very large amounts of power and is rapidly growing. In discussing the price of electric power the lecturer indicated the practicability of obtaining large amounts of electricity from efficient power stations in this country at a price as low as one-fifth of a penny per unit or even less for secondary power or restricted supplies. Reference was made to the many metallurgical processes in which electricity is already used, including the treatment of aluminum, cadmium, cobalt, copper, lead, tin, zinc and many other metals in which the Institute of Metals is interested.

The low level to which copper has fallen during the past month has been mainly responsible for the dullness of the non-ferrous industry. Copper dropped to £39 17s 6d on May 4, this being the lowest price recorded since 1895, when business was done at £38 12s 6d. Consequently buyers are becoming more cautious than ever. The further restriction imposed on the production of tin has not had time to make any impression on current supplies. Tin has not been so cheap for nearly thirty years. There has also been a low record created for spelter which has been down to £11 1s 3d. In consequence of the weakness of copper, sheets have been reduced £2 to £75 and the brass and copper tube makers in Birmingham have made reductions of ¼d per pound in solid drawn brass tubes, solid drawn copper and brazed brass.

There has been little change in the brass foundry industry of Birmingham. Seasonal work in the building trade has stimulated the market slightly and home orders for cabinet work have improved. One prominent firm in Birmingham which has taken up stainless steel fittings is doing a fairly brisk trade, and this to some extent replaces fitments formerly made in brass and bronze. Despite the depression of industry generally, a great deal of attention is being paid to the reconstruction of retail stores, and non-ferrous metals are being used to a considerable extent in this work. Export trade continues slow, though certain parts of Africa are showing increasing interest.

The demand for aluminum hollow-ware has been maintained on a fairly good scale for home business, but this has not been achieved without considerable effort by the leading makers, who have launched especially keen advertising campaigns as they felt bound to bring in extra business to counteract the loss sustained in export markets such as Australia, where aluminum is regarded as a luxury and therefore excluded.

J. A. H.

Business Items—Verified

General Bronze Corporation, 34-19 10th Avenue, Long Island City, N. Y., will not construct additions to plant. Project in abeyance.

Auto Electric Service Station, 504 Depot Avenue, Dixon, Ill., has installed an aluminum foundry, and is now employing a molder and coremaker. Proprietor is **William B. Rusch.**

Fisher Brass Company, Marysville, Ohio, has completed construction of a new foundry building at its plant and has added equipment for polishing, machining and chromium plating.

Strahs Aluminum Company, dealers in all commercial forms of aluminum, have removed their offices and warehouse to 60 Walker Street, New York City. Telephone numbers are Canal 6-0920 and 0921.

Wedlake Aluminum Company, 1616 Willow Avenue, Hoboken, N. J., has succeeded the **Wedlake and Lamson Company. E. C. Wedlake** is proprietor. Company operates a brass, bronze and aluminum foundry.

McAleer Manufacturing Company, Detroit, Mich., producer of metal polishes, etc., reports for first quarter of 1931 an increase of about 60% over business for same 1930 period. This includes for this year the pre-season orders.

Banner Bed Corporation, Chicago, Ill., recently organized to manufacture metal bedsteads, has leased about 9,650 sq. ft. floor space at 400-8 North Oakley Boulevard, for establishment of plant. Company does stamping, brazing, grinding, polishing, lacquering and japaning.

Union Metal Works, Inc., Carter Street, Chelsea, Mass., manufacturer of plumbers' metal goods, has purchased equipment, patterns and other assets of **Hamlin and Emery Brass Company,** Boston, which recently suspended operations, and will remove to plant at Chelsea, where expansion will be carried out.

Kromo Plate Corporation, New York, has been ordered by the Federal Trade Commission, Washington, D. C., to cease using the terms "chromium," "chrome," "cromo" to designate a plating compound not substantially composed of chromium metal. Company is described as a manufacturer of silver polish.

Bellvue Industrial Furnace Company, Detroit, Mich., now in receivership, is in much improved condition, according to **B. V. Unwin,** receiver. Business has shown steady increase and continuation of operations under receivership is expected to benefit creditors considerably more than a forced sale would, the receiver states.

American Lead Company, 1600 East 21st Street, Indianapolis, Ind., has arranged for consolidation with **Indiana Smelting and Refining Corporation,** and will operate in future under first-noted name. Expansion will be carried out with removal of Indiana Smelting plant to American Lead works, where production will be concentrated.

Ludlow Valve Manufacturing Company, Troy, N. Y., has formed the **Canadian Ludlow Valve Manufacturing Company, Ltd.,** with registered offices in Montreal, and with Drummond, McCall and Company, Montreal, as sales agents for the Dominion. Ludlow valves and hydrants will be manufactured in Canada, and while the Canadian company's operations will be under the direction of the parent company, the capital involved, labor employed, and material will be Canadian.

Review of the Wrought Metal Business

By J. J. WHITEHEAD

President of the Whitehead Metal Products Company of New York, Inc.

JUNE 1, 1931.

Very rapid progress is being made in the fundamental readjustments necessary to insure business stability. These consist of continuous accumulation of liquid capital; protracted under-consumption, reduction of stocks; readjustment of prices and costs. Certainly prices of commodities have been adjusted and sufficiently deflated to insure the conduct of any business enterprise with confidence, provided a sufficient number would gain enough confidence to follow their convictions. It is believed that when the next pick up comes it will, as usual, be felt first by the retailer; that it will gain headway very rapidly because under-consumption has persisted altogether too long, and because stocks of everything are extremely low and shelves are bare.

At the moment, with copper at 8¾c, the situation is not a pleasant one for producers. The average cost of copper production is higher than this, and large companies are producing copper at a loss, but at that it is cheaper to keep going than to shut down entirely.

Naturally, with falling prices no one wishes to purchase more than his immediate requirements, and for that reason the demand for copper and copper products is absolutely on a hand-to-mouth basis. It is believed that just as much copper could be sold at 11c or 12c as at the present price. Perhaps when the conferences between the copper producers of this country and those abroad have been finished the situation may materially improve. These conferences have now been under way for quite a while, and should end either during the last days of May or early in June.

There is one significant feature about metals other than copper and copper products, and that is that the steady prices have certainly helped confidence in these metals and this has resulted in users more freely purchasing their requirements. With copper and copper products declining, prices have just about scared everyone to death. This attitude is not warranted.

The aluminum demand keeps up and has not suffered so severely. The level price situation, as indicated above, has helped greatly to keep confidence, and a more liberal buying policy is very apparent.

Nickel and Monel metal demand is holding fairly well but, of course, is not at the same rate as in boom times. The new uses for these materials are helping to stabilize the tonnage used. When the pick-up comes the demand for nickel and Monel is sure to be large.

"Small orders and quick delivery," is the slogan of business today. Business seems to be bumping along the bottom, and so are commodity prices. It is not inconceivable that further slight price reductions may occur, but they will be of a minor character. It is possible that a couple of months of hesitation will ensue, but certainly in the fall, business in metals should improve.

Metal Market Review

By R. J. HOUSTON

D. Houston and Company, Metal Brokers, New York

COPPER

JUNE 1, 1931.

Developments in copper were depressing and disappointing during the past month. Early in May the market was 9¼ cents, but a resumption of the downward trend sent the price to 9 cents and in the second half of the month to 8¾ cents delivered to Connecticut, Valley points. This figure was a record low for all time. At the beginning of the year the metal sold at 10½ cents which compared with 13 cents a year ago and 18 cents two years ago. In March, 1929, sales were made at 24 cents for domestic account and at 24⅜ cents for export. Sales in May were in moderate volume.

The pronounced change in the trend of market values means heavy losses for the copper industry. Even the most favored group of producers, which have been able to cut costs to the minimum, cannot be expected to operate indefinitely on the present basis. Various plants have been showing deficits for months past. Another depressing factor was the heavy increase of 13,716 tons in refined stocks during April. These are now the largest since November, 1930. There was also a big slump in domestic deliveries, the figures for April being 20,118 tons less than for March, the smallest takings by the home trade in 12 months. Exports fell off 4,579 tons. The simple and credible explanation of present conditions is the fact of overproduction. There has been some curtailment of output, but it is obvious that the remedy has not been drastic enough. Wasteful and unprofitable production has become a national development. Its immediate and specific effects are tragic and call for wise and sane regulation.

Some holders of copper, anxious to liquidate part of their stock, sold a considerable tonnage at 8½ cents. Export price was also reduced to 9.02½c. c.i.f. European ports. Large orders were booked at the new price. Market outlook unsettled and uncertain.

ZINC

Zinc sold down to 3¼ cents East St. Louis basis early in May. Consuming demand was limited, but improvement in market tone and buying interest developed after the first fortnight, with price of Prime Western 3.35 to 3.40 cents for the East St. Louis position. Sellers became more reserved in offering for future shipment after booking fairly large business. There was an increase in smelters' stocks in April of 1,719 tons. Production, however, was smaller for that month, amounting to only 29,137 tons. Deliveries in April fell off sharply to 27,418 tons as compared with 35,224 tons in March, a decrease of 7,806 tons. Total stocks in smelters' hands May 1 amounted to 143,212 tons. All of these developments reveal clearly the reason for conservative buying until more constructive movements are recorded.

TIN

The downward trend in tin carried the price for prompt Straits tin to 22⅞ cents in May. This was the lowest domestic quotation since 1902, when a low of 22.60 cents was reached. There were several unsettling factors which had an adverse effect on this market. Acute weakness in Wall Street, rumors of dissension over agreement for restriction of output and apathy of consumers added to the influences which discouraged any broad or constructive movements. A reduction of 20,000 tons per annum in output at leading centers of production has been recommended. The decrease under the revised quotas would greatly help the position of tin by bringing supply and demand more closely in balance. Fluctuations since May 1 covered the narrow range of less than ⅝ of a cent a pound. This contrasts with a spread of 10 cents, and more, in a single month a few years ago.

LEAD

Leading producers in the east and middle west made two cuts in the price of lead last month. The total reduction amounted to a decline of 25c per 100 lbs. New York delivery and 20c per 100 lbs. at East St. Louis. The lower prices occurred in the first half of May. A large volume of orders was promptly booked at the new figures. Current prices are the lowest this year, and the more attractive levels brought corroders, cable makers and other large consumers into the market for substantial tonnages. Requirements for June and nearby futures are expected to stimulate further demand and bring about a fresh movement into consumption. Low prices are having their effect upon production. United States output during April totaled 35,498 tons, against 41,775 tons in March, a decline of 6,277 tons. There was an increase in stocks, however, of 2,567 tons. Total stocks at end of April amounted to 132,993 tons. These stocks are the largest on record.

ALUMINUM

With the market for aluminum under strong control it is natural to find a continuance of both steady and profitable prices for the new metal. Consumption has been in substantial volume lately, due to a considerable extent to recent greater activity in the automotive industry. Some excellent buying was also reported by the power and light companies in recent weeks. These interests have placed large orders for steel reinforced aluminum cable since the beginning of this year. Copper and aluminum are the two important metals used for power transmission. Competition between the two commodities has frequently been keen, but the low price situation in copper is now greatly to the advantage of the red metal. Of the 19 transmission lines with a capacity of 220,000 volts in the United States, 16 are aluminum cable and three are copper. On January 1, 1931, there were 365,000 miles of aluminum cable in use in the United States. Expansion of new uses for aluminum has been continuous, and this is evident by the fact that $1,000,000 worth of aluminum chairs are in use.

ANTIMONY

Antimony sales last month were made up of small lots, and even these were not numerous enough to make for a large aggregate total. A slow sagging market forced the price to 6.40 cents duty paid, which was a new low for the year. Buying interest for future delivery was lacking most of the time. Large tonnage inquiries are missing from the market. Consumers buy cautiously and in small lots.

QUICKSILVER

Conditions in quicksilver are quiet, with recent demand moderate on quoted basis of $101 for round lots. Prices on small parcels range from $102 to $103 per flask of 76 pounds.

PLATINUM

Prices for platinum are firmer and quote $23 and upwards per ounce. Estimated world production of platinum in 1929 was 198,157 ounces. The world consumption of new platinum was placed at about 200,000 ounces a year. Russia is the largest producer with 100,000 ounces to its credit. Colombia ranks second at 55,000 ounces and South Africa third in importance with a production of 21,608 ounces.

SILVER

The depressed state of the silver market continues. Less resistance has been shown to the downward trend lately, caused by selling in the Far East. A new low for May was established at this writing on the basis of 26½ cents per ounce. This compares with 28⅜ cents a few weeks ago. Trading in the commodity is limited, and the action of China and India indicates the cautious attitude of the Orient to the metal. The market lacks strong support and there are no signs of stabilization of prices at anything like former levels.

OLD METALS

Movements in secondary metals reflect the continued weakness for the new metals. Domestic and export buyers have reduced their bids and sellers have had to relinquish their previous ideas to effect business. There is, however, considerable unsettlement apparent in all quarters of the trade. Many have been looking for a definite turn for the better, and undoubtedly this will develop eventually, but the average dealer is hardly ready to bid up prices on the present outlook. A fair demand was reported for lead and zinc, also copper wire, at inside prices.

Daily Metal Prices for Month of May, 1931

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	4	5	6	7	8	11	12	13	14	15	18
Copper c/lb. Duty Free												
Lake (Del.)	9.625	9.625	9.625	9.625	9.625	9.625	9.625	9.625	9.375	9.375	9.375	9.125
Electrolytic (f.a.s. N. Y.)	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.25	9.25	9.25	9.00
Casting (f.o.b. ref.)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	8.75	8.75	8.75	8.75	8.75
Zinc (f.o.b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	3.35	3.35	3.25	3.25	3.25	3.25	3.25	3.30	3.40	3.40	3.40	3.40
Brass Special	3.40	3.40	3.30	3.30	3.30	3.30	3.30	3.35	3.45	3.45	3.45	3.45
Tin (f.o.b. N. Y.) c/lb. Duty Free												
Straits	23.45	22.875	23.30	23.35	23.30	23.25	23.20	23.20	23.25	23.35	23.40	24.15
Pig 99%	22.75	22.125	22.625	22.65	22.60	22.50	22.45	22.45	22.50	22.625	22.65	23.40
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb.	3.80	3.80	3.80	3.80	3.80	3.65	3.60	3.60	3.60	3.60	3.60	3.60
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	35	35	35	35	35	35	35	35	35	35	35	35
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	6.75	6.70	6.70	6.70	6.65	6.65	6.60	6.55	6.55	6.50	6.50	6.50
Silver c/oz. Troy Duty Free	28.25	28.375	28.25	28.375	28.375	28.25	28.00	28.25	28.375	28.125	28.00	27.625
Platinum $/oz. Troy Duty Free	23.00	23.00	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	21.50	25.00

	19	20	21	22	25	26	27	28	29	High	Low	Aver.
Copper c/lb. Duty Free												
Lake (Del.)	9.125	9.125	9.125	9.125	9.125	9.125	8.875	8.875	8.875	9.625	8.875	9.315
Electrolytic (f.a.s. N. Y.)	9.00	8.875	8.875	8.875	8.875	8.875	8.75	8.75	8.75	9.50	8.75	9.161
Casting (f.o.b. ref.)	8.75	8.50	8.50	8.50	8.50	8.50	8.50	8.25	8.25	9.00	8.25	8.714
Zinc (f.o.b. St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	3.35	3.35	3.35	3.30	3.30	3.30	3.30	3.25	3.25	3.40	3.25	3.314
Brass Special	3.40	3.40	3.40	3.35	3.35	3.35	3.35	3.30	3.30	3.45	3.30	3.364
Tin (f.o.b. N. Y.) c/lb. Duty Free												
Straits	23.625	23.20	23.10	23.30	23.10	22.80	22.90	22.50	22.625	24.15	22.50	23.201
Pig 99%	22.975	22.50	22.375	22.65	22.50	22.125	22.25	21.875	22.00	23.40	21.875	22.499
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb.	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.80	3.60	3.65
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Ingot	35	35	35	35	35	35	35	35	35	35	35	35
Shot	36	36	36	36	36	36	36	36	36	36	36	36
Electrolytic	35	35	35	35	35	35	35	35	35	35	35	35
Antimony (J. & Ch.) c/lb. Duty 2c/lb.	6.45	6.45	6.45	6.40	6.40	6.40	6.375	6.375	6.30	6.75	6.30	6.521
Silver c/oz. Troy Duty Free	27.25	27.50	27.50	27.125	26.625	26.75	26.50	26.875	26.00	28.375	26.00	27.637
Platinum $/oz. Troy Duty Free	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	21.50	23.310

Metal Prices, June 8, 1931

(Duties mentioned refer to U. S. tariffs on imports, as given in the Tariff Act of 1930.)

NEW METALS

Copper: Lake, 8.375. Electrolytic, 8.125. Casting, 8.00.
Zinc: Prime Western, 3.20. Brass Special, 3.25.
Tin: Straits, 22.30. Pig, 99%, 21.75.
Lead: 3.60. **Aluminum,** 23.30. **Antimony,** 6.30.
Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: flask, 75 lbs., $102. **Bismuth,** $1.50.
Cadmium, 55. **Cobalt,** 97%, $2.50. **Silver,** oz., Troy (N. Y. official price June 8), 26.625.
Gold: oz., Troy, $20.67. **Platinum,** oz., Troy, $37.50.

INGOT METALS AND ALLOYS

		Duty
Brass Ingots, Yellow	6½to 7½	45%
Brass Ingots, Red	8⅜to10	45%
Bronze Ingots	9⅜to11	45%
Casting Aluminum Alloys	19 to22	4c lb.
Manganese Bronze Castings	18 to35	45%
Manganese Bronze Ingots	8 to11	45%
Manganese Bronze Forgings	30 to40	45%
Manganese Copper, 30%	20 to30	25%
Monel Metal Shot	28	25%
Monel Metal Blocks	28	25%
Phosphor Bronze Ingots	9¾to12	45%
Phosphor Copper, guaranteed 15%	13 to16	3c lb.
Phosphor Copper, guaranteed 10%	12 to15	3c lb.
Phosphor Tin, no guarantee	30 to40	Free
Silicon Copper, 10%	20 to30	45%

OLD METALS

	Buying Prices	Duty
Crucible Copper	6 to 6¼	Free
Heavy Copper and Wire, mixed	5½to 6	Free
Light Copper	5 to 5¼	Free
Heavy Brass	3¼to 3⅜	Free
Light Brass	2½to 2¾	Free
No. 1 Composition	4¾to 5	Free
Composition Turnings	4¼to 4½	Free
Heavy Lead	2½to 2¾	2⅛c. lb.
Old Zinc	1⅜to 1¼	1½c. lb.
New Zinc Clips	1¾to 2	1½c. lb.
Aluminum Clips (new, soft)	13 to14	4c. lb.
Scrap Aluminum, cast, mixed	3¾to 4¼	4c. lb.
Scrap Aluminum sheet (old)	9½to10½	4c. lb.
No. 1 Pewter	12½to13½	Free
Nickel Anodes	22 to23	10%
Nickel Sheet Clips; rod ends (new)	24½to25½	10%

Wrought Metals and Alloys

Effective May 27, 1931

COPPER MATERIAL

	Net base per lb.	Duty
Sheet, hot rolled		2½c. lb.
Mill shipment	18⅝c.to19⅝c.	
From stock	19⅝c.to20⅝c.	
Bare wire	10½c.to10¾c.	25%
Seamless tubing	21⅛c.to22⅛c.	7c. lb.
Soldering coppers:		45%
Lots of 300 lb. or more	17¼c.	
100 to 300 lb.	17¾c.	

NICKEL SILVER (NICKELENE)

Net base prices per lb. (Duty 30% ad valorem.)

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	23¾c.	10% Quality	26⅞c.
15% Quality	26c.	15% Quality	30⅞c.
18% Quality	27¼c.	18% Quality	34⅜c.

BRASS MATERIAL—MILL SHIPMENTS

Net base prices per pound

	High Brass	Low Brass	Bronze	Duty
Sheet	16c.	17⅜c.	18c.	4c. lb.
Wire	16½c.	17⅞c.	18½c.	25%
Rod	14¾c.	17⅞c.	18½c.	4c. lb
Brazed tubing	24⅝c.		28⅝c.	12c. lb.
Open seam tubing	24c.		26c.	25%
Angles, channels	24c.		26c.	12c. lb.
Seamless tubing	20⅞c.	21¾c.	22⅝c.	8c. lb.

TOBIN BRONZE AND MUNTZ METAL

Net base prices per pound.	(Duty 4c. lb.)
Tobin Bronze Rod	17⅞c.
Muntz or Yellow Metal Sheathing (14"x48")	18c.
Muntz or Yellow Rectangular sheet other sheathing	18c.
Muntz or Yellow Metal Rod	15⅛c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb. 32.30
Aluminum coils, 24 ga., base price 30.00

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods..... 50c. Cold Rolled Sheet..... 60c.
Hot Rolled Rods..... 45c. Full Finished Sheet..... 52c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base) 35 Full Finished Sheets (base) 42
Cold Drawn Rods (base) 40 Cold Rolled Sheets (base) 50

SILVER SHEET

Rolled sterling silver (June 8) 29.75c., Troy oz. upward, according to quantity. (Duty free.)

ZINC SHEET

(Duty 2c. per lb.)

	Cents per lb. Net Base
Carload lots, standard sizes and gauges, at mill, less 7 per cent discount	8.75
Casks, jobbers' price	9.00
Open casks, jobbers' price	10.00to10.25

BLOCK TIN SHEET

(Duty free.)

Block Tin Sheet—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more, 12c. over N. Y. Pig Tin; 50 to 100 lbs., 18c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over.

BRITANNIA METAL SHEET

No. 1 Britannia—18" wide or less, No. 26 B. & S. Gauge or thicker, 500 lbs. or over, 10c. over N. Y. tin price; 100 lbs. to 500 lbs., 12c. over; 50 to 100 lbs., 18c. over; 25 to 50 lbs., 20c. over; less than 25 lbs., 25c. over. Prices F. O. B. mill. (Duty free.)

Supply Prices, June 8, 1931

ANODES

Copper:	Cast	19⅞c.	per lb.
	Rolled, sheets, trimmed	17⅜c.	per lb.
	Rolled, oval	16⅜c.	per lb.
Brass:	Cast	18⅜c.	per lb.
Zinc:	Cast	10½c.	per lb.

Nickel:	90-92%	44c. to 45c.	per lb.
	95-97%	44c. to 47c.	per lb.
	99%	46½c. to 49c.	per lb.

Silver: Rolled silver anodes .999 fine were quoted June 8 from 29.75c. per Troy ounce upward, depending upon quantity.

FELT POLISHING WHEELS WHITE SPANISH

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1″ to 2″	$3.00/lb.	$2.75/lb.	$2.65/lb.
10-12-14 & 16	2 to 3½	3.00	2.70	2.50
6-8 & over 16	1 to 3½	3.10	2.85	2.70-2.75
6 to 24	Under ½	4.25	4.00	3.90
6 to 24	½ to 1	4.00	3.75	3.65
6 to 24	Over 3	3.40	3.15	3.05
4 to 6	¼ to 3	4.85	4.85	4.85
4 to 6	Over 3	5.25	5.25	5.25
Under 4	¼ to 3	5.45	5.45	5.45
Under 4	Over 3	5.85	5.85	5.85

On grey Mexican wheels deduct 10c. per lb. from White Spanish.

COTTON BUFFS

Full Disc Open buffs, per 100 sections.

11″ 20 ply 64/68 Unbleached	$16.38 to 20.28
14″ 20 ply 64/68 Unbleached	24.32 to 30.12
11″ 20 ply 80/92 Unbleached	20.48 to 25.36
14″ 20 ply 80/92 Unbleached	30.17 to 37.37
11″ 20 ply 84/92 Unbleached	24.60 to 35.59
14″ 20 ply 84/92 Unbleached	36.53 to 52.80
11″ 20 ply 80/84 Unbleached	26.35 to 32.63
14″ 20 ply 80/84 Unbleached	39.06 to 48.38

Sewed Pieced Buffs, per lb., bleached .....30c. to 69c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.09¾-.14
Acid—Boric (Boracic) Crystals	lb.	.07¾
Chromic, 75 to 400 lb. drums	lb.	.15-.20
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls.	lb.	.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.15¾-.21¼
Denatured, drums	gal.	.30-.50
Alum—Lump, barrels	lb.	.03¾-.04
Powdered, barrels	lb.	.03½-.04
Ammonium sulphate, tech., bbls.	lb.	.03½
Sulphocyanide	lb.	.36
Arsenic, white, kegs	lb.	.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.58
Borax Crystals (Sodium Biborate), bbls.	lb.	.04½
Calcium Carbonate (Precipitated Chalk)	lb.	.04
Carbon Bisulphide, Drums	lb.	.06
Chrome Green, bbls.	lb.	.24
Chromic Sulphate	lb.	.30-.40
Copper—Acetate (Verdigris)	lb.	.23
Carbonate, bbls.	lb.	.16½-.17½
Cyanide (100 lb. kgs.)	lb.	.41
Sulphate, bbls.	lb.	.046
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.27
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluor-spar (Calcic fluoride)	ton	$70.00
Gold Chloride	oz.	$12.00
Gum—Sandarac	lb.	.26
Shellac	lb.	.59-.61
Iron Sulphate (Copperas), bbl.	lb.	.01½
Lacquer Solvents	gal.	.85
Lead Acetate (Sugar of Lead)	lb.	.13¼
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Nickel—Carbonate, dry bbls.	lb.	.32
Chloride, bbls.	lb.	.18-.19½
Salts, single, 300 lb. bbls.	lb.	.10½-.13
Salts, double, 425 lb. bbls.	lb.	.10½-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.08
Potassium Bichromate, casks (crystals)	lb.	.09¼
Carbonate, 96-98%	lb.	.07
Cyanide, 165 lbs. cases, 94-96%	lb.	.50-.60
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge, nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.04½-.05¾
Silver Chloride, dry, 100 oz. lots	oz.	.24¾
Cyanide (fluctuating)	oz.	.32-.40
Nitrate, 100 ounce lots	oz.	.21½
Soda Ash, 58%, bbls.	lb.	.023
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.17
Hyposulphite, kegs	lb.	.03½-.04
Nitrate, tech., bbls.	lb.	.03½
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.02
Sulphocyanide	lb.	.32½-.42½
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.28
Tripoli, Powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc, Carbonate, bbls.	lb.	.11
Chloride, casks	lb.	.06¾
Cyanide (100 lb. kegs)	lb.	.38
Sulphate, bbls.	lb.	.03½